

AUSTRALASIAN MEDICAL CONGRESS.

(FORMERLY THE INTERCOLONIAL MEDICAL
CONGRESS OF AUSTRALASIA.)

TRANSACTIONS

OF

THE EIGHTH SESSION,

HELD IN

MELBOURNE, VICTORIA

OCTOBER, 1908.

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SECTION OF DISEASES OF CHILDREN.

PRESIDENT'S ADDRESS.

LEAD-POISONING IN CHILDHOOD.

A. JEFFERIS TURNER, M.D., Lond., D.P.H., Camb.

My first duty is to thank you for the honour that you have done me in electing me to this chair, an honour that I feel none the less because I know that it is partly due to a wish to do honour to the State in which I reside.

I have come to this Congress rather as a learner hoping to pick up fresh knowledge from those working in the larger centres of medical practice. It would, I think, be out of place for me to attempt an address of a general character, and I have preferred to deal with a single topic of considerable practical importance in my State at least, on which I may have something to bring forward that may not be familiar to all of you: I mean lead-poisoning in childhood. I should like this contribution to be open to criticism, as this will enable me to express myself more freely, which may be more useful than anything delivered *ex cathedra*.

Let me at once give you my theses, and then develop my discourse under each heading:—

(1). Though lead-poisoning is practically unknown among adults in Queensland, except among those specially exposed to it by occupation, such as painters, yet lead-poisoning among children is not uncommon in every township in Queensland. By not uncommon I mean that every medical man practising to any extent among children should probably see several cases every year.

(2). That the causation of the disease has been ascertained, and that similar cases must occur in all those parts of Australia, in which similar conditions may happen to prevail.

(3). That the symptoms of lead-poisoning in children differ from those found in adults in certain important particulars, which have not yet found their way into the text-books, and that as a consequence the real nature of the affection is very frequently overlooked or misunderstood.

I. THE OCCURRENCE OF LEAD-POISONING AMONG CHILDREN IN QUEENSLAND.

My experience is confined mostly to Brisbane. I see cases rather commonly in private practice, more commonly since I have come to recognise the milder cases and earlier stages. A few of these cases have come from other towns. The records of the Children's Hospital show that 262 cases have been treated as in-patients since 1891, and at present some 20 cases are being admitted every year.

Most of these cases occurred in Brisbane children, but not all. We have seen cases from Townsville, Charters Towers, Maryborough, Gympie, Southport, Toowoomba, Warwick, and by chance one case from Kiama in New South Wales.

II. THE CAUSATION OF LEAD-POISONING AMONG QUEENSLAND CHILDREN.

This has been most convincingly demonstrated by Dr. Lockhart Gibson in the *Australasian Medical Gazette* in 1904, and again in the transactions of the last Congress. I need, therefore, refer to the subject only briefly. Nearly all the dwellings in Queensland are built of wood, and in the towns the wood is covered by paint, consisting largely of white-lead. Exposed to our hot summer sun, this paint rapidly weathers, and becomes reduced to a powdery condition. This is particularly noticeable on verandah railings. The verandahs are favourable playgrounds for young children, who clasp the railings with their moist hands, which become covered with poison. Thence it finds its way to the child's mouth, especially in children who suck their fingers or bite their nails. Dr. Gibson's investigations explain :—

- (1). Why the disease is found in children from all towns in Queensland, but appears to be unknown in the country, where the houses are of wood, but not painted ;
- (2). Why it is most prevalent in the summer months ; and (3), Why it frequently picks out one child only in a family, attacking the one who bites his fingers or sucks his thumbs, or who plays habitually on the verandah, &c.,

It follows of course that similar cases must occur in any districts of the other States, if such exist, where the dwelling houses are similar, even though such cases may have never been recognised.

I do not mean to deny that lead-poisoning may occasionally, but rarely, occur among Queensland children from other sources than that here given. but I have no doubt whatever that this is the cause of the endemic prevalence of this form of sickness.

III. THE SYMPTOMATOLOGY OF LEAD-POISONING IN CHILDREN.

There are two signs of lead-poisoning in children, that are not properly speaking morbid symptoms, but which are of great value as indicating the presence of lead in the tissues. Firstly, the so-called "blue line" on the gums. A continuous line is rather exceptional in children, what we usually see are small blackish dots at the extreme edge of the gum opposite some of the teeth, more particularly those that are not so clean as the rest. They are frequently minute, and need to be looked for in a good light, and sometimes with the aid of a lens. I repeat they have to be looked for ; on a casual inspection they will certainly be missed. Where there is actual pus exuding from the gum I have seen a dark black line on the edge of the sinus, and even discoloration of the cheek opposite to it, but this is rare. A discoloration of the base of the tooth itself, is no sign of plumbism ; and doubt as to the site of the blackness may be at once removed by inserting the edge of a piece of stiff note-paper between the gum and the tooth.

These dots in the gum are pathognomonic. But they may occur in the absence of symptoms. When a child exhibits symptoms of plumbism an examination of the teeth of its brothers and sisters will sometimes reveal

the presence of the dots in them, though they are in apparently good health. This *stigma* of plumbism may, as I have observed, be followed later by the usual symptoms. On the other hand the complete absence of lead-dots is of no importance in diagnosis. It is frequent in characteristic cases. The lead dots are particularly likely to be absent if the child has a clean set of teeth.

The second stigma of plumbism is the presence of lead in the urine. The detection of traces of lead in this fluid should be the task of a trained analyst. Lead is by no means constantly present in the urine of these children, therefore little weight, if any, should be given to a single or even several negative findings. On the other hand, the presence of lead in the urine is positive proof that the metal has been absorbed into the system. For clinical purposes an analysis of the urine is, I think, seldom necessary.

We now pass to the symptoms proper. These are very various, and it is necessary to classify them into groups.

(1). *Gastro-intestinal symptoms.*

These correspond to the lead-colic of adults, but are less defined. The child complains of abdominal pain, which is often plainly of a colicky nature. There is no abdominal tenderness, but pressure frequently gives relief. Vomiting, often persistent and lasting for several days, is a usual accompaniment. During this time all food is often rejected, with complete impartiality. The bowels are usually constipated, but this is not invariable, sometimes there are rather frequent small stools containing much mucous.

If these symptoms are accompanied by dots on the gums, the diagnosis is easy. If the latter are absent it may be difficult, but may often be made with a high degree of probability. One feature of these attacks is that they are independent of the nature of the food the child has taken, and another is their periodicity. If a child is brought with a history of attacks at intervals of a few weeks or months, during which it is continually vomiting and complaining of abdominal pain, while in the intervals it eats everything without suffering, plumbism should be strongly suspected. If pain in the legs accompanies that in the abdomen, plumbism may be safely diagnosed, and when the child—perhaps after several attacks—begins to drop its toes when walking, there is no longer any room for doubt.

In doubtful cases the fingers should be inspected to see if the nails are bitten, and if the house is visited the condition of the paint on the verandah railings and other parts, together with the habits of the child as to play, &c., should be inquired into.

(2). *Paralysis of the muscles of the limbs.*

Lead-poisoning and wrist-drop are so closely associated in the mind of the profession, that it is necessary to say at once that wrist-dropt is *not* the most characteristic paralysis in childhood. It is frequently absent in children under twelve years of age. When present, it is never the first paralytic symptom. The feet are invariably affected first, and are in variably the last to recover. This is at least so in my experience.

The earliest muscles to become paretic or paralysed are the tibialis anticus and extensor longus digitorum pedis. The child drops its toes in walking, and the nature of its ailment can be recognised as it walks

into the consulting room. There are, of course, other causes of this form of paralysis, such as arsenical and alcoholic poisoning and beri-beri; but I have not so far met with any instance in which these have complicated the diagnosis. The peronei are also frequently attacked, and occasionally suffer worse than any other muscles. In the forearm the extensors of the fingers are attacked before those of the wrist, as is the case in adults. Paralysis of the small muscles of the thumb, accompanied by wasting is often seen in severe cases, and the interossei may be similarly affected. In the muscles of the hand paresis and wasting appear to be simultaneous, and in this respect they differ from the muscles of the forearm and leg.

A very common symptom attending the onset of the paralysis is pain in the muscles of the legs. This comes on especially at night, when the child frets and cries and cannot go to sleep. The pains are usually accompanied by tenderness of the muscles, but may be relieved by warm fomentations. When severe they are accompanied by evident cramp, affecting particularly the calf-muscles. I have seen extremely painful cramps of the back-muscles, and of other muscles also as in a case of which I made the following note during an attack:—"The child lies on its face, embracing a pillow with both arms. When the pain comes on the head is thrown back by spasmodic contraction of the back-muscles, the muscles of the arm are in tonic spasm, the legs are flexed, and hamstrings forcibly contracted. The legs are tender, and the slightest touch causes the child to cry out. The abdomen is not tender, and stands firm pressure well. Mind is perfectly clear; the child is very intelligent." This was an extreme and very unusual condition.

If the child is removed from the source of the poison the forearm muscles usually recover in a few weeks, those of the hand more slowly. The leg-muscles are much more slow to recover; three months may suffice in recent cases, but some take much longer. Talipes equinus may persist after the anterior muscles have regained contractility, and it is then necessary to divide the tendo Achillis. Complete recovery is usual. In old cases with relapses—in some the history had spread over several years—I have seen apparently incurable paralysis, but in the light of recent advances in the treatment of paralyzes, I am not sure that any case should now be regarded as hopeless.

(3). *Diaphragmatic and cardiac paralyzes.*

One of the less frequent symptoms of plumbism is paralysis of the diaphragm, of which I have seen a fair number of cases, but only in patients suffering from the usual paralyzes of the legs. In itself it is not a serious symptom, for this paralysis gives rise to no embarrassment of respiration in a child lying in bed, and will indeed escape observation, unless carefully looked for. Most of my cases were old-standing cases of plumbism, but I have seen diaphragmatic paralysis in a first attack. When it comes on acutely I regard it with grave anxiety, for two or three times I have seen it accompanied or followed by fatal cardiac weakness. This is characterized by excessive weakness and rapidity of the pulse, intense general depression and vomiting, without any intellectual disturbance, and death occurs usually within 24 hours. I am unable to explain these symptoms, but they are very similar to some fatal cases of poisoning by diphtheria toxins, which occur in a late stage of that disease.

(4). *Remote effects. Anæmia, Albuminaria, Nephritis.*

Old-standing cases of plumbism are frequently distinctly anæmic with sallow complexions. This is not so in recent cases.

Transitory albuminuria is not uncommon. Chronic interstitial nephritis is, I believe, an occasional but rare complication. A case which ended fatally, is reported by Dr. T. E. Green (*Australasian Medical Gazette*, October, 1897).

(5). *Eclampsia.*

Now and again children suffering from chronic plumbism develop eclamptic seizures. These do not differ symptomatically from convulsions due to other causes, but are of a severe type and not infrequently fatal, even when treated with the greatest skill from the onset. I believe that a good many cases of fatal convulsions in Brisbane are the effect of undetected plumbism. A few months ago I was called in consultation to see a boy dying from protracted convulsions. Careful inquiry failed to elicit any exciting cause, but an examination of the gums revealed the typical appearances caused by the deposit of sulphide of lead.

(6). *Acute optic neuritis associated with oculomotor paresis.*

The far-reaching effects of plumbism in childhood are not yet exhausted. The most insidious and most damaging I have not yet even mentioned. There is a totally distinct clinical complex first recognised by myself long before I had any idea of its causation, and described at the Intercolonial Medical Congress of 1892 as "A Form of Cerebral Disease Characterized by Definite Symptoms, probably a Localised Basic Meningitis." I mention this purposely, as it is with meningitis and cerebral tumour that this form of lead-poisoning is most likely to be confounded. This mistake has been made frequently in the past, and will, no doubt, be repeated in the future. Nevertheless, the diagnosis of this condition is not, as a rule, difficult to those familiar with it.

These cases are usually brought to us complaining of headache, which may be severe and persistent, and may be accompanied by vomiting. We observe at a glance that they have an internal squint. Sometimes the squint is the symptom for which they are brought, but on the other hand it may be so slight as to have escaped the mother's observation. On inquiry we learn that the squint is recent, and on examination we find that it is due to paresis of one or both external recti. This ascertained, we proceed to examine the optic discs, and discover optic neuritis, so intense in most cases as to be evident even to the tyro in ophthalmoscopy. This symptom complex is due to lead-poisoning. We proceed to verify our diagnosis. In default of any corroborative evidence of lead, we must remember that a cerebral tumour, cerebral tubercle, or cerebral syphilis, *might* produce exactly these symptoms, and no other; but it has happened in all the cases of tumour or cerebral syphilis that I have seen, that other symptoms not characteristic of lead have been present; so that the probability of a case, such as I have described, occurring in Brisbane, or any town similarly painted, being due to any other cause than plumbism, appears to be very small.

In more severe cases, which are less often seen, the cerebral and ocular symptoms are more pronounced. We see these children usually in bed. In addition to headache there may be severe pains in the back of the neck

running down into the arms. The head may be retracted. Both external recti are completely paralysed, and some, or all the muscles supplied by the third nerve (except the levator) may be paralysed also. There may even be immobility of the pupils. These cases are frequently confounded with meningitis. It is a natural, perhaps an inevitable, mistake. But inspection of the gums may save even the inexperienced from error. If the gums are clean, the bitten finger nails may arouse his suspicions. The course of the case is not that of an ordinary meningitis. The child almost always makes a perfect recovery, except as to vision. I can remember only one of these cases that proved fatal, unless convulsions supervened—but there is almost always some loss of sight, which may be total.

Blindness due to optic atrophy, and therefore permanent and hopeless, is the unfortunate consequence of a large percentage of these cases of plumbic ocular neuritis. It may occur in the milder cases in which only the optic and sixth nerves are involved; when the third nerve is implicated, escape from at least partial loss of vision is rare. In many cases the blindness is absolute, in some there is only great impairment of vision. The suddenness with which this is lost has struck me forcibly. One day there may be nothing to suggest defective vision, within the next two days the child may be found apparently quite blind. Fortunately the great majority of the milder cases recover perfect vision, if they come under treatment early.

It is a remarkable thing that children who suffer from ocular neuritis do not suffer from limb-palsy. I have never seen the conditions combined. Dr. Lockhart Gibson has once observed wrist-drop in a child suffering from ocular neuritis, and two or three cases in which the limb-palsy had preceded or followed ocular neuritis at an interval of many months. Cases of the two forms occurring in the same family are not so rare.

A large proportion of lead-poisoning in children takes on the form described in this section. Of eighty-nine cases of plumbism admitted during the last four years into the Children's Hospital, Brisbane, twenty were of this variety, that is 22.5 per cent.

(7). *Chronic optic neuritis and atrophy without paresis of sixth nerve.*

These cases are much less often seen than the preceding. I have no experience of them, and Dr. Lockhart Gibson has only recognised them within the last three years. The symptom complained of is loss of sight, and the ophthalmologist is most likely to be consulted. The course is slow, and they respond well to treatment if not too advanced. Diagnosis can only be made by finding evidence of lead in the system, or of exposure to the causes of plumbism.

PREVENTIVE AND CURATIVE MEASURES.

There may be, and doubtless are, other conditions attributable to lead than those recognised, but those I have described are sufficient to show that lead-poisoning among children is a serious evil, and one that should not be tolerated. Prevention is easy. Paint containing lead should never be employed on outside surfaces such as fences, walls, and particularly verandah railings in places where children, especially young children, are accustomed to play. Zinc-white, or some other paint free from lead should be substituted. Unfortunately we in Brisbane still from ignorance,

no longer excusable, allow our houses to be poisoned traps for children's fingers, and every year furnishes its quota of ill-health and suffering, crippling, hopeless and permanent blindness, and occasionally death, as the natural consequence. This is certainly a matter which calls for legislative interference.

The curative treatment consists essentially in removing the child from the source of the poison. We adopt also other measures calculated to encourage the elimination of lead from the system, but to what extent these are efficacious must be a matter of doubt. By themselves they are useless. Removal of the child into a hospital is a short way of taking it out of danger. But after its discharge it will surely relapse, if the home conditions remain the same. We must find out exactly where the child got the poison, and warn the parents to keep him away from it, remembering that lead paint is only dangerous (1) when it is fresh and sticky, or (2) and more especially when it is dry and powdery. It is also well to break the child of the habit of nail-biting or thumb-sucking, which, by the way, is no easy task. The most effectual method is to put straight splints over its elbows. This may seem harsh treatment, but milder methods usually fail.

THE FREQUENCY AND INTENSITY OF CONGENITAL SYPHILITIC INFECTION IN CHILDREN.

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In this paper I propose to treat of some of the inferences I have, after many years of hospital and private practice, drawn of the frequency and intensity of congenital syphilitic infection in children, an infection to which so many degenerations and dystrophies have been attributed that their description would fill volumes.

I assume this infection to be transmitted if there have been positive parental indications of syphilis or a confession on the part of one or both parents of having had the disease previous to their somatic separation from the offspring, or if there have been undoubted signs of syphilis either in the secundines or in the child at any time.

The recognition of the syphilitic factor in pediatry and the evaluation of its influence in generating and hastening pathogenic processes are so difficult that many practitioners are stone blind to this factor except when the disease presents itself in the strong light of the text book typical description.

Professor Alfred Fournier stated that it takes ten years to obtain a competent knowledge of syphilis in the adult. It takes many more to fathom its varied effects on the child.

When I joined the honorary staff of the Children's Hospital, Melbourne, in January, 1883, I detected very little syphilis. As the years passed, my eyes were gradually opened until I saw signs of the infection in about 30 per cent. of the cases under treatment. I know that the late Dr. W. Snowball, who was my colleague, held the same opinion as to the

frequency of the disease. Hospital statistics are valueless in settling this question, as the name syphilis appears in the records only in the gravest cases. It must remain a matter of opinion until some one with time and energy devotes himself to the elucidation of the facts.

What is the prevalence of the *infection* in private practice? I have estimated it to be there present in about 20 per cent. of the sick children; so combining hospital and private practice I think I am not far from the truth in saying that fully 25 per cent. of the sick children in Melbourne are tainted with syphilis. The late Professor Senn affirmed that this was about the proportion for the sick children of New York.

Now what proportion of all our children are infected? From my knowledge of the individuals of over 300 families, many of whom I have been attending for more than 20 years, I have inferred that fully 14 per cent. of these families are infected, having taken in account only the pronounced cases and rejected the numerous doubtful ones where the symptoms were too indefinite to admit of a positive diagnosis.

Syphilitic fathers have, as a rule, strong sexual passions. When the miscarriage stage in their families is passed the birth-rate is increased owing to the poly-mortality among the syphilitic children, but the death-rate is so great that syphilitic families have fewer living children than others. The average number of children in the infected families was 37 per cent. less than in the non-infected. From these data we calculate the proportion of syphilitic children in all these families at a little over 9 per cent. As the percentage of infected children is higher in hospital than in private practice, if we take the total number of children in the city, this percentage would be a little raised; so we may infer that about 10 per cent. of the total number of children in this community are syphilised. The proportion of syphilitics in the adult male population of Paris and New York has been reported to be about the same as I make it here. Probably, therefore, the percentages of infected children would be the same. So in this respect Melbourne does not appear to be any better off than these cities.

How does the syphilitic factor affect the work of the practitioner? Taking the total number of my attendances during the first eight months of this year on the children under 15 years of age belonging to the families above referred to, I find that over 60 per cent. were on infected children, although they were only 9 per cent. of the total number in these families. This means that on the average the non-infected child has seen me once, while the infected child has seen me fifteen times. From these data I calculate that the syphilitic factor had some influence in increasing my work among the children in these families by 127 per cent.

Besides increasing the practitioner's practice the specific infection greatly increases his death-rate.

I have judged the syphilitic element to have been present in 16 per cent. of the fatal cases of the first half of my private practice, the period of my comparative ignorance of this subject, my knowledge of its presence in these cases being obtained almost entirely from my subsequent acquaintance with the living members of the bereaved families. During the second half of my private practice, the period of my increased and increasing knowledge I have found the specific factor present in over 40 per cent. of the children who died. From this I infer that the chances of an

infected child dying are nearly seven times greater than those of one free from infection. The inference, I admit, is founded on too small a number of instances (173) to be of much value, but it gives some indication of a syphilitic factor in children so frequent and grave that it must be reckoned with to insure the best treatment of their diseases.

APPROXIMATE VARIATIONS IN THE INTENSITY OF THE INFECTION.

The taint of syphilis may affect any part of the child's body, for there is no organ or tissue which is free from the ravages of the disease. The intensity of its incidence on the separate organs or on the individual as a whole, may be so mild as to be almost negligible or so severe as to bring about the total abolition of function of one or more organs, or the abolition of function of the organism—somatic death.

The components are many which cause variations in this intensity. One of the most important is the ancestral, the intensity in the child in each receding generation being an inverse function of the intensities of the infection in the parents at the time when the offspring was capable of being so parentally influenced. The intensity is least when the infection is transmitted by the father alone, greater by the mother alone, and greatest by both parents, in the last case producing, according to Fournier, 92 per cent. of pronounced syphilitics with 68.5 per cent. of deaths.

Speaking generally, the potency of the infection in each parent varies, directly as the original virility of the strain of the *spirochæta pallida*, directly as the duration of the infection, within certain limits, when the patient has been brought under the treatment and varies, inversely as the efficiency of the treatment, inversely as the length of time which has elapsed after the maximum, and inversely as the total resistance of the patient. The interaction of these components, the relative values of which we are ignorant, has produced so many clinical surprises as to give rise to the saying that there is nothing certain about syphilis except its uncertainty.

What is stated here of the parents applies also to the child, *mutatis mutandis*. So that the combination of all the influences determining the gravity of a congenital syphilitic infection assumes an increasing degree of complexity as the child grows and syphilis becomes more uncertain still, producing greater clinical surprises, such as deaths from very slight causes, and even sudden deaths from no obvious cause.

The variations in the intensity (I) of a congenital syphilitic infection may be stated symbolically thus—

$$I \propto \frac{(f + m) \text{ s.d.}}{T \cdot t (r_1 + r_2 + r_3 + \&c.)}$$

where f is the intensity of the father and m that of the mother; s is the *spirochæta's* virility; d is the duration of the infection before treatment. (In the adult in untreated cases it is stated that the intensity generally reaches its maximum during the third year, while in the child in untreated cases the maximum is at variable periods sometimes being deferred till puberty. In both adult and child proper treatment generally decreases the intensity.) T is the efficiency of the treatment and t the time which has elapsed after the maximum. By r_1 r_2 r_3 , &c., are denoted the resistances of the separate parts of the organism, and by r_1 plus r_2 plus r_3 plus, &c., the patient's total resistance.

The influences of time (t and d) and treatment (T) produce remarkable variations in the intensity of the infection. The usual order of events following syphilis in the parents inefficiently treated is abortions, still births, births of syphilitic children, and births of children apparently healthy. I have seen this order reversed. Proper treatment for a short time followed by marriage with cessation of all treatment has been the probable cause of the reversal. I have also seen a minimum following a maximum of intensity, a miscarriage, then the birth of an apparently healthy child, and this repeated several times in the same family. I attributed these extreme variations in intensity to intermittent treatment of the parents. I have had under my care several families in each of which prophylactic treatment of both parents has been followed by the births of apparently healthy children, while before treatment there were only miscarriages and deaths in infancy.

Syphilis is a disease in which the results of good treatment are often very brilliant, and those of bad treatment often very disastrous. Owing to the intensity of the infection some patients are so rebellious to treatment that nothing can save them.

The question is often asked, How long should treatment be continued? It has been asserted by authorities that marriage may be permitted after five years of treatment, if during the last two there has been no manifestation of the disease, and that the children will then be born healthy. They will be only apparently so, for they have the taint, nevertheless. I have seen cases where there has been no sign of the disease observed in the parents for many years, and yet a child has been born with severe syphilis. I have also seen tertiaries in old age in parents who have reared a family of apparently healthy children. In one such case tertiaries developed in the father more than forty years after the primary infection.

Syphilis is never cured. Its intensity is decreased by treatment, but never vanishes. Its attack may be renewed when least expected. Syphilitics abstaining from marriage would be an act of justice to humanity, though of serious detriment to our incomes.

Syphilologists say that one must be ready to treat acquired syphilis during the life of the patient. I would extend the treatment to the next generation, some would to the third. There are some authenticated instances published of syphilis acquired from the grandparents, but I have not observed any pronounced cases where I was sure the infection was so derived. I have seen cases of severe syphilis, so-called binary syphilis, in the third generation from a reinfection of a congenitally syphilitic parent. Here we would expect the intensity to be greater, the factor f plus m being increased *ceteris paribus*. Most of the severe cases reported of this atavism are really cases of binary syphilis.

Congenital syphilis should be treated for two or three years or longer, according to its gravity. Infection is thus mitigated, but not annihilated. The treatment must be renewed *pro re nata* during the whole extent of the patient's life. Congenital syphilitics should be treated for the syphilitic factor, if possible, during all their illnesses and before surgical operations. The number of deaths in children under 15 years of age per cent. of attendances on the sick was, during the first half of my private practice, more than three and a half times that of the second half. More frequent recognition and treatment of the syphilitic element during the second period had probably some influence in decreasing the death rate.

Severe infection properly treated will often handicap a child less than a mild one with little or no treatment. A child with pronounced mild

syphilis properly treated in infancy has often a greater chance of living through an acute illness than an infected child who, having no evident symptoms of infection, gets no treatment. It is these mild neglected cases—the factor (d) being prominent—which near puberty develop tertiary symptoms, so-called *syphilis tarda*.

GENERAL AND LOCAL RESISTANCE.

The components denoted by r_1 , r_2 , r_3 , &c., which, taken all together, make up the patient's general resistance, are the most intricate and most variable of all the factors determining the intensity of the infection.

The total resistance r_1 , plus r_2 , plus r_3 , plus &c., is lowered by all depressing influences, as improper feeding and bad hygienic surroundings. This may account in some degree for the comparative severity of hospital cases. Narcotic drugs, such as alcohol and opium, lower the resistance. Without alcohol the cases would be fewer in number, and less severe. Alcohol often holds the reins at the starting point—the introduction to the initial sore—and retains them during the downward drive. The worst cases are met with in alcoholics and their children, and are the hardest to treat, because of the concurrence of the degenerations of alcohol and syphilis. The effects of each are sometimes so intermixed that their clinical disentangling is impossible. Narcotics aggravate the infection, probably by retarding phagocytic reaction, and rendering it incomplete, as pointed out by Metchnikoff, when opium is given in cases where pathogenic microbes have invaded the tissues.

The resistance is lowered by the presence of other diseases, and the resistance to other diseases is lowered by the presence of syphilis. It is this reciprocal action which accounts in a great measure for the extreme frequency of disease and death in the children of infected families.

There seems to be in these children a peculiar vulnerability of epithelium which facilitates the attack of infective organisms. They are very prone to eruptions on the skin, and to the formation of abscesses in which it is said streptococci are frequently found.

The *Bacillus Tuberculosis* readily attacks them. I have inferred that about 30 per cent. of the children with tubercular hip disease are congenital syphilitics, and that the proportion in other cases of tuberculosis is about the same except in tubercular meningitis, where the percentage in my cases during the last fourteen years was as high as 60. This high percentage was probably caused by the lowered local resistance due to the partiality of syphilis for the nervous system.

During the last fourteen years of my private practice among children the only fatal case of septicæmia, the only two fatal cases of measles, and half the fatal cases of pertussis, were congenital syphilitics. In reading over the cases of infectious diseases in children under fifteen years of age, which I have reported to the Board of Public Health during the last thirteen years, I found that the percentages of syphilitic children attacked were, for diphtheria, 44; measles, 28; scarlatina, 25; and typhoid fever, 21. Taking the average liability of the non-syphilitic child to be attacked as unity, the liability factors are calculated to be 6.7, 3.5, 3, and 2.4, respectively. The inference is that, exclusive of widespread epidemics, the chances of getting typhoid fever are, for a syphilitic, nearly two-and-a-half times as great as for a non-syphilitic, for scarlatina, three times, for measles, three and a half times, and for diphtheria, nearly seven times. My experience has shown that infected children are extremely liable to diphtheria, and it generally hits them hard.

The resistance of the separate organs r_1 , r_2 , r_3 , &c., presents extreme variations both as to its intensity, and as to the particular parts affected, and this is often the case even in children of the same family. In one family one child had infantilism, another had Parrott's paralysis, and another died of specific heart disease. In another family there was in one child severe syphilis in infancy, with subsequent diminished growth, speech defects, and a broken leg, an enlarged spleen in another child, and cranial bosses and a broken leg in another.

Each of these components r_1 , r_2 , r_3 , &c., has, in my opinion, always a definite positive value which is never zero. This means that the child born of a syphilitic parent is infected to a greater or lesser degree throughout his whole body, although there may be no clinical sign of the disease. The child is never free from infection, as some writers would have us believe. He may have an outside apparently very good, but a very bad inside, which is often discovered only post-mortem. This apparent health is the point to which I wish to draw particular attention.

Lowered resistance to infection is often most conspicuous in the nervous system, the chief victim of congenital syphilis, as it is of tertiarism in the adult. I have found an involved syphilitic factor in most of the children's nervous diseases that I have treated (variations in intensity here are often marked, one of my congenital syphilitics was a paralytic idiot, another was at school a champion athlete, with a high degree of intelligence).

Lowered resistance in the circulatory system is shown by the frequency of congenital heart disease in infancy, of hæmorrhages, particularly hæmaturia, in early and middle childhood, of heart disease in later childhood, and, I may add, of pulmonary hæmorrhage from tuberculosis in early adult life, and of cerebral hæmorrhage in later adult life. In 50 per cent. of my fatal cases of heart disease in children during the last fourteen years, there was a syphilitic factor.

The resistance of the respiratory system is frequently lowered in these unfortunate children. They are very liable to pneumonia, and their pneumonias are often complicated with empyemas. Half of my fatal cases of pertussis during the last fourteen years were syphilitics, who died of superadded broncho-pneumonia.

As to the digestive system, 40 per cent. of my fatal cases of gastro-enteritis for the same period were syphilitics.

In regard to the kidneys, I have found kidney disease common in syphilitic children, and very frequent when they take scarlatina.

The osseous system also is much deteriorated, and its resistance to strain much decreased. In my practice, most of the fractures that I have treated in children have occurred in syphilitics. In one family, a son broke one arm twice in the same place, and the other arm once; another son broke his arm twice in different places, a daughter broke her leg, and the father broke his arm; seven fractures in one infected family. These fractures generally unite well, strange to say, but sometimes there is hyperplasia in the callus. I know of two such cases, in each of which an operation was advised for excessive callus formation, after fracture about the elbow, interfering with the use of the joint. The functions of the joint were restored by iodide and mercury. In cases of so-called tuberculosis of bone, with much hyperplasia, I have found a syphilitic factor generally present. When syphilis is apparently localized in the bone, and of great intensity, a wrong diagnosis is often made. Such

cases are usually mistaken for malignant disease. In many cases of disease of bones, including three femora, in which amputations were recommended, I have seen the functions restored by anti-syphilitic treatment.

The glandular system also cannot resist the infection. Post-nasal growths are often syphilitic, and post-nasals recurring after operation nearly always are so. When there is any suspicion of infection in these cases it is my unremunerative custom to treat for syphilis before operating if the operation is not urgently demanded. And this is often the only treatment they require. Many other glands have been saved from excision, and patients have escaped many other unnecessary operations through the timely recognition and treatment of the syphilitic element.

A word as to the embryo. If the intensity of the infection is great, and either general or localized in a part necessary to life, death occurs. When it is great, and localized elsewhere, it may cause serious constructive or destructive degenerations, for example, polydactylism, or harelip, and cleft palate, and yet the child may show no positive signs of syphilis. The results of operation in these oral deformities are frequently so disastrous when the infection is present, and it often is present, that the child should always be treated with mercury before operating if there is any suspicion of syphilis.

To sum up, the main inferences I have drawn are:—

That if either parent has ever had syphilis, no matter how well treated, there is a syphilitic taint in the child subsequently born, a taint which, although latent, may determine the point where—

“ Comes the blind Fury with the abhorréd shears,
And slits the thin-spun life.”

That fully 10 per cent. of the children in this community are infected with syphilis.

That this small percentage affords material for more than half the pediatric work of the general practitioner and includes nearly half of his fatal cases.

That, speaking generally, the chances of dying before puberty are, for the syphilitic, seven times greater than for the non-syphilitic.

That infected children should, if possible, be treated in all their illnesses for the syphilitic factor—the favourer of pathogenic microbic associations. That if this were done, there would be fewer severe cases and fewer deaths.

That before operating on congenital syphilitics the surgeon should, if possible, subject each one of them to a course of anti-syphilitic treatment for otherwise, on account of their lowered resistance, they take anæsthetics badly, do not stand operations well, and are liable to post-operative development of infective organisms, *ab interno*, as well as *ab externo*. That operations would then be fewer, often more successful, and less often fatal.

In conclusion, after more than a quarter of a century of clinical experience gained from over a quarter of a million of attendances on the sick, I am convinced that among the many handicaps which the offspring of the species *homo sapiens* has to contend against in the struggle for existence, one of the most common, if not the most common, and one of the most baneful, if not the most baneful, is the *damnosa hereditas* of a syphilitic infection.

CONGENITAL SYPHILIS AND ITS PREVENTION.

W. ATKINSON WOOD, M.D., M.S., Melb., D.P.H., Lond.

The three great white plagues are tuberculosis, alcoholism, and syphilis. The ravages of the first can be computed, and are being dealt with satisfactorily.

The ravages of the second are approximately known, and are openly discussed by the public, and a progressive policy is being adopted.

But the ravages of syphilis are not even known by the medical profession, as statistics are not reliable.

The only published information about syphilis was that an annual average of 25 died from syphilis in Victoria (Vital Statistics, Government Statist), and from the Children's Hospital reports for the last ten years, which tell us that during that period 22 cases have been treated as in-patients, and that seven cases have died from syphilis.

That these records in any way represent the ravages of syphilis, none of us will believe, and yet many of us are content to ban the name syphilis, and give it a soft-sounding epithet of specific, blinding, perhaps not ourselves, but certainly the public, who should be as much educated in the symptoms, causes, and effects, as they now are in tuberculosis.

In order to get a true idea of its prevalence among the out-patients at the Children's Hospital, I collected my out-patient books, and took the histories of 75 cases, and found that typical symptoms of congenital syphilis existed in 5.175 per cent. of my out-patients. Many more had a syphilitic taint, but came up for enteritis, broncho-pneumonia, &c. These are not included.

The out-patient death records are kept in separate certificate books, and I found that out of 1,323 deaths, 186 (76 females and 110 males) were signed up syphilis, lues, specific or congenital disease, *i.e.*, one death in seven.

The average age at death was four months.

This does not include those signed up premature marasmus, inanition, debility, &c., which often mean syphilis. The death-rate from syphilis in England and Wales is 1.2 per 1,000 births. In our hospital alone, it is .76 per 1,000 births in Victoria. The real death and morbidity rate of syphilis is difficult to compute, as syphilis soon loses its typical symptoms, but leaves the health undermined so that the patients are more liable to die of intercurrent disease.

Symptoms.—I do not propose to repeat the well-known early symptoms of congenital syphilis, as they generally clear up rapidly with mercury treatment; this is often a drawback, as the mothers are lulled by a false security into thinking the disease is cured, and they do not trouble to return until a relapse takes place.

But I wished to determine—

- (a) The length of treatment they had undergone, and the present symptoms.
- (b) The present physical condition.
- (c) The mental condition gauged by their class in school. (For this purpose I obtained from the Education Department a return showing the average age in each class.)

| Number. | Original Severity. | Length of Time under Treatment. | Present Condition, at least a Year later. | | | Height. | Head Circumference. | Class in School. |
|---------|--------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------|---------------|----------------------|-------------------------------|-------------------------------|----------------------|
| | | | Symptoms. | Age in Years. | Weight in lbs. | | | |
| 1 | Very slight | Attended irregularly during six months | Still palmar psoriasis .. | 13½ | .. | 54½ 59 (Normal for age) | 20 21½ (Normal for age) | 3rd 5th Normal |
| 2 | Slight .. | Regularly for fourteen months .. | Healthy | 3 | .. | 32 30 (Normal for age) | 19½ 19 (Normal for age) | |
| 3 | Medium .. | About six months .. | Syphilitic facies .. | 11 | .. | .. | .. | 2nd 4th(Normal) |
| 4 | " .. | Regularly for two months .. | Puny and pale, rash, does not walk or talk | 1½ | 21 23 (Normal) | .. | 18½ 18½ (Normal) | |
| 5 | Severe .. | Regularly for two months, then irregularly; no treatment for last three months | Condyloma ani, ear and nose discharge, snuffles, spirochætae found | 3 | .. | .. | .. | |
| 6 | Slight .. | Three months .. | Pale, puny .. | 1 | 15 18 (Normal) | .. | 16½ 17½ (Normal) | |

In the above table, No. 2 had satisfactory treatment, and appears to be normal at three years old, but the others had but scant treatment, and were backward physically and mentally, and this result was shown in the great majority of my cases.

One family will often provide many cases of degeneracy. Thus, in a family of nine—

First died at 24 hours old of convulsions.

Second died at 14 months, backward.

Third died at 9 months, marasmus.

Fourth alive, is an idiot.

Fifth, backward, was in double Thomas for two years.

Sixth and seventh, mother says are healthy.

Eighth and ninth, have acute syphilitic symptoms.

The fifth child in this series throws light on many of the quasi tubercular cases which do not clear up with prolonged rest; many of them require mercury and potassium iodide as well.

This family also shows how the virulency tends to become less as time goes on, even without treatment.

Thus, the first three die before fourteen months, the next survives, but is an idiot, the next has joint disease, and the last four have syphilis in a less severe form.

In one case, the mother told me she had eight children, all healthy, but on taking individual histories, I found that—

The eldest has tuberculosis, and is a glassblower.

The next two are glass-blowing.

The next two are backward at school:

And the last three (triplets) have typical acute syphilis.

This shows you cannot always rely on a mother's statement, and the necessity for the compulsory reporting of syphilis, as the three eldest should certainly not be glass-blowing.

The combination of syphilis and tubercle is here shown, and often found. Syphilis seems to be a *prédisposing* cause.

So far, I have considered undoubted syphilitic cases, but we often find doubtful cases, such as in one where the child was of good colour, but snuffles, and slight buttock rash existed, with a good family history. The symptoms cleared with mercury, and I was doubtful, till a few months later the case returned with condyloma ani. Some diagnose syphilis much more often than others, and doubtful cases may in future be decided by the serum diagnosis. *Spirochætæ* have been found in several cases, but especially in the condylomata.

I have seen two cases of children of congenital syphilitic mothers. In the first there was palmar psoriasis, and the child was backward at school, and physically undeveloped, and a brother had infantile paralysis; and in another the child had chronic rhinitis. In both cases, the mothers had keratitis, and were deaf. In later cases, teno-synovitis and gummata, simulating malignant disease, hydrocephalus, spina bifida, cleft palate, intrauterine amputations, and constrictions, rectal constriction, besides many of the nerve cases are in my collection.

In 51 syphilitic families, the parents having been married ten years on an average—

160 children were alive. .

58 children were dead.

44 miscarriages.

Or an average of three maimed children, one dead, and one miscarriage, as a result of ten years' married life.

In five syphilitic families, there were 27 live (but maimed children), and 21 dead children, besides miscarriages.

Some syphilitic lives, however, turn out well. One who was adequately treated when young was a leading footballer in his school team.

But what becomes of most of these syphilitic children. We do not see many adult cases, as many of them are carried off by one of the epidemics, or the common bowel or chest troubles, and are signed up accordingly.

Some, however, survive, and perhaps have been our patients for some time before it suddenly dawns upon us that they are congenital syphilitics grown up, perhaps without good hearing or good sight; perhaps with some obscure nervous disorder, or constantly recurring skin trouble, or abdominal complaint; many beyond the stage where mercury can do them much good, a blighted life, an unfair struggle for existence, and all due to a preventable cause.

Treatment.—The ordinary mercury treatment generally suffices to clear up immediate symptoms within a couple of months, but it should be continued for twelve months at least, and then intermittently given for another year.

In some of the latter cases I have had good results with the intramuscular injection of soamin when mercury failed.

Medical men do not, as a rule, explain to the mothers the necessity for prolonging treatment after the symptoms have abated, and but few use the word syphilis, for the reason that it may lead to family troubles.

But let us examine the following case of a family:—

First child, full time, born dead.

Second child, full time, born dead.

Third child, full time, born dead.

Fourth child, living in good health; mother had mercury pills during her pregnancy.

Fifth, full time, born dead.

Sixth, full time, born dead.

Seventh, lived two months (death certificate—lues).

Eighth, present child, dying of syphilis.

If syphilis had been fully explained to that mother after the birth of her first child, and she had had proper treatment, the lives of seven children would have been saved.

In order that constant treatment may be kept up for a sufficient time, we must explain the case to the mother, and afford her every facility for getting the required drugs.

With this end in view, I have written the following card, to be given to the mothers at the hospital, on which I would ask your criticism:—

CARD FOR MOTHERS AT THE CHILDREN'S HOSPITAL.

1. Your child is, in my opinion, suffering from syphilis.
2. This is a curable disease, but only by continuous treatment for twelve months and intermittent treatment for twelve months longer, *even when the child is apparently healthy.*
3. You can obtain medicine for one month from the hospital, at the end of which time you must return for another month's supply; or you can get tickets for medicine from a local chemist, as much time is wasted in coming to the hospital.

4. If this treatment is not carried out, your child may be backward, or become blind or deaf, or suffer from nervous, bone, or skin disease in after life.

5. The disease can be spread by contact, by kissing, by towels, spoons, or cups, therefore the patient should not be kissed by others (except by the mother, who cannot take the disease), and should only use its own towels, cups, spoons, &c.

6. The child may readily give the disease to any nurse who suckles it.

7. If you become pregnant again, *immediately go to a doctor and show him this card*, and he will give you medicine which you must take throughout your pregnancy; you will then probably have a healthy baby.

8. If the child ever becomes ill, always show this card to the doctor attending.

This would prevent much illness in the after life of the child, and many succeeding miscarriages.

I do not say that every syphilitic should be told the real position of affairs, *e.g.*, the matter might be glossed over in a grown-up congenital syphilitic where most of the damage is already done, or in private cases the father could be told, and he would see that the treatment would be carried out; but at the Children's Hospital, where we only see the mothers. I think some such card is necessary, and the history card should have some distinctive mark upon it to remind the physician in after treatment.

In every case some responsible person should be told, so that sufficient treatment will be carried out.

CONCLUSION.

That syphilis is probably the direct or indirect cause of more deaths in infants than any other disease. The returns, tabulated by the Government Statist, per 1,000 births, are, *e.g.* :—

| | | | |
|---------------------------------------------------|-----|-----|------|
| Diarrhœal disease ... | ... | ... | 26.6 |
| Wasting disease (premature marasmus debility) ... | ... | ... | 34.5 |
| Bronchitis pneumonia ... | ... | ... | 9 |
| Whooping cough ... | ... | ... | 2 |
| Convulsions ... | ... | ... | 3 |
| Other causes ... | ... | ... | 19 |

We know that it is the congenital syphilis that swells the record of all of these classes, and that premature marasmus and debility practically spells syphilis, so that published statistics give the medical profession and the public no idea of its ravages.

The medical man is in many instances to blame for this state of affairs, as he avoids signing a certificate syphilis; but there is often an excuse in that syphilis is but a predisposing cause of death.

It does more harm in the Children's Hospital than anywhere else!

It has been said by the "unco guid" that syphilis is a well-merited disease; that only the man suffers from it who goes in search of it. But in our hospital it is an unmerited disease, and the unfortunate children suffer in the most cruel of all ways from a disease which is more preventable than tuberculosis.

Is it from our hospital that we can most feelingly appeal for help for the innocent sufferers, and to whom:

- 1st. To the shrieking sisterhood, who think of it only as a disease affecting the wicked man and woman?
- 2nd. To the clergy, who hold similar views?
- 3rd. To the public, who hold no views, but who would shiver at the word, and change the subject?

I. What are we now doing?

Not much. We treat cases with mercury when they attend the hospital, but we do not impress the future dangers on the mothers, or the necessity for prolonged treatment. Prostitutes with syphilis must live. Fournier reports such a case who received five men daily for five months, and could thus have infected 750 men in that time.

Another prostitute said that "as a man gave syphilis to her, she was glad to give it to as many men as possible in return."

Prostitution can never be stopped, but it can be regulated. In my student days, we had a female lock ward at the Melbourne Hospital; this even does not now exist, and absolutely nothing is done for them in the way of isolation. They therefore spread syphilis broadcast.

II. What should we do?

We know we have efficient remedies, but to put them into force we must educate the public, as we are doing so efficiently with tuberculosis.

To educate, we must call the disease by its proper name, spell it with a large S if necessary, and tell the public of its present and future dangers. Youths should attend lectures on the subject, given in plain language and in a fatherly way.

Other classes, such as soldiers and sailors, could, in addition, be told of the uses of calomel ointment, cleanliness, and such like preventive treatment.

I think that every acquired case, both male and female, should be compulsorily notifiable.

In order to prevent the spread of the disease, we must turn our attention to the *demi-monde*.

"To cleanse the brothel is not only to protect those that frequent it, it is also to protect the family hearth, the honest woman, the child, and the race."

We must prohibit prostitutes with syphilis from carrying on their trade. If the Government do this, they should provide homes for them, preferably in the country, and free if necessary, where they can obtain adequate and compulsory treatment until the most contagious stage is passed. They should afterwards be compelled to return at stated intervals for muscular injection treatment. This treatment lasts longer, and we are sure they are getting it.

The male cases, after being reported, should be given a card, drawn up by the Board of Public Health, fully explaining the disease, and compelling them, under pains of penalty, to undergo a full course of treatment, free, by an approved Government doctor, if necessary. This could be done either by intramuscular injections, or by packets of tickets, each ticket to represent a week's mercury pills, which could be obtained from local chemists subsidized by the Government.

As the treatment is to be compulsory, we must make it easy to obtain free if necessary, and it must be adequately supervised.

This method would also insure privacy, although those treated by tickets should report themselves periodically to the Government doctor.

Those treated privately should be compelled to forward a doctor's certificate periodically to that effect every quarter for two years at least.

The drawbacks to the present mode of hospital treatment are that the patient wastes a great deal of time, and probably loses his employment, while attending the hospital; he in consequence shirks treatment after the acute symptoms have subsided.

The man who is afraid of the publicity of an hospital, and cannot afford a lengthy private treatment, has an extra inducement to shirk treatment.

In a recent newspaper interview with our President concerning this Congress, the chief subject, Syphilis, was referred to as "specific disease," which but few would understand means syphilis. This is our first obstacle. To educate the public we must at least call the disease by its proper name, and tell them all about it.

Syphilis is preventable, and it is the main duty of this Congress to devise practical means of prevention. We must do our duty, without fear of what man *or* woman may say in consequence.

A PROPOSAL TO DIMINISH THE PREVALENCE OF SYPHILIS AND OTHER VENEREAL DISEASES.

RECOMMENDED BY SECTION OF DISEASES OF CHILDREN.

Syphilis is contracted mostly in youth or early manhood. It is contracted by those who are ignorant of the nature and extent of the risk they may run. They do not know how widespread the contagion is and how great the chances of infection to any one who indulges in illicit intercourse. They are ignorant of the terrible and far-reaching results of infection, of the remote vascular, visceral, and nervous degenerations. They are ignorant of its ravages in the home, and of how it destroys, cripples, or debilitates the second generation.

There is a belief or prejudice, rather widespread among young men, and unfortunately encouraged by some of riper years, that incontinence is, if not a necessity, at least an advantage to physical vigour, and that its contrary is a mark of weakness of body or poorness of spirit.

From this ignorance and this delusion are largely derived an immense amount of suffering and disease only too well known to the medical profession. The responsibility of those who know to enlighten those who do not know, and are in danger, is great, pressing, and not to be evaded.

It is proposed that a committee be appointed to draw up a short statement, carefully and judiciously worded, freed from all taint of sentimentality, of the plain and honest truth on these matters, for distribution among young men, this statement to be of an authoritative character, and signed by leaders of the profession.

This statement to be printed as a circular, and in such numbers as may be found necessary, and that the method of its distribution be determined by the Committee.

That the expenses of printing and distributing be defrayed by voluntary subscriptions from members of the medical profession, and that the *Australasian Medical Gazette* and *Intercolonial Medical Journal* be asked to invite and receive subscriptions.

That the Committee take immediate action, watch the effect of such action, and report on the matter to the next session of Congress.

TREATMENT OF CONGENITAL DISLOCATION OF HIP.

A. JEFFREYS WOOD, M.D., Hon. Medical Officer, Children's Hospital, Melbourne.

The treatment of congenital dislocation of the hip joint at the Children's Hospital, Melbourne, up to 1899, was most unsatisfactory, and no permanent good resulted from the prolonged extension that was so often employed in these cases.

Dr. Lorenz, in 1895, published a paper on the bloodless reduction of congenital dislocation of the hip, and in 1899 a bloodless reduction of a case of congenital dislocation of the hip was effected by Dr. Atkinson Wood at the Melbourne Children's Hospital. This case was shown at the Medical Society of Victoria two years later, and proved to be a true anatomical reduction. In 1903, Dr. Lorenz's visit to America and England brought his method of reduction into considerable prominence; and a practical paper in the *Practitioner* by Dr. Jackson Clarke at that time did much to popularize the operation amongst the members of the staff of the Children's Hospital. The method received considerable condemnation, as being most unsurgical, from the surgeons of other Melbourne Hospitals on one occasion when some rather startling statements had been telegraphed from America. But the excellent results attained by the method are now recognised by both the public and profession.

Le Damany, in an excellent article on this subject (*Rev. de Chirurgie*, 1906), says that the conditions which ought to be fulfilled in the treatment of congenital dislocation of the hip are: first, that it does no harm; second, that it is efficacious; and third, that it can be performed by any practitioner with an ordinary knowledge of surgery. That these conditions are fulfilled by the operation as now carried out in Melbourne I think all will agree.

Regarding diagnosis, if all children who showed signs of limping from the time they began to walk were suspected to be cases of congenital dislocation of the hip, there would be fewer cases missed than there are at present. Frequently one hears the story that the parent has been told that the child will grow out of the limp. Early diagnosis means early treatment, and the ease with which the reductions are effected in young children makes it most desirable that the hip should be reduced as early as possible after the diagnosis.

The child with a unilateral dislocation of the hip lurches over to the affected side, and goes down with all its weight on the affected side, differing from the case of tubercular hip, that limps on to the sound leg.

Flexion and adduction are very free on the side which is dislocated, so that the inner side of the knee of the affected leg can be made to lie on the ribs on the opposite side of the sternum with ease. Abduction is limited on the affected side.

The line joining the anterior superior spines and the line joining the tops of the trochanters should be parallel in normally placed hips. If they converge at one side the trochanter is certainly above Nelaton's line on that side. An X-ray photograph is the most satisfactory way, however, of demonstrating the existence of congenital dislocation of the hip. If the child is young, an anæsthetic is always advisable when the skiagram is taken. The tube should always be placed directly over the mid line, and fairly high, as the distortion of the acetabulum that results from its central position is thereby lessened, although the exposure may be somewhat lengthened. The child should rest evenly on her back, the thighs

extended and parallel with the axis of the trunk, and the legs flexed and hanging over the edge of the couch, so as to show that the position of the femora is symmetrical, and that rotation either internal or external is absent. If the child has walked the head of the femur on the dislocated side will be found to be above the line joining the position of the two Y-shaped cartilages in the skiagram. This line can be drawn with a ruler on the unprepared side of the negative. Before walking there is little more than the absence of acetabular roof and rotation of the femur to notice in the negative. An X-ray photograph should also be taken after the application of the plaster; the plaster is cut away freely from the perineal and adductor region, and this permits an excellent photo to be taken of the position of the head of the femur with relation to the inter-Y line.

The sound leg is flexed and abducted into a similar position to the affected limb in plaster when this second photograph is being taken.

The following is the method of reduction that we have adopted at the Children's Hospital. It is Kummell's method, as used by the late Professor Hoffa, with the exception of the preliminary tenotomy:—

A preliminary subcutaneous division of the adductor tendons is usually practised. The child, some days later, is fully anæsthetized with chloroform; an assistant steadies the pelvis on the sound side by pressing the flexed thigh and leg down on the pelvis. The operator then takes the affected thigh, with the knee flexed, in his right hand, and forcibly abducts it with external rotation, first moving back towards the buttocks, and then back to the horizontal position again, whilst gradually increasing the hyper-extension. Hoffa compares the movement to that of a pump handle. This is continued until every trace of a resisting band has disappeared from the adductor region, and often, as the last band gives way under pressure, the head slips into the acetabulum with an audible click. The acetabulum is then enlarged, and the anterior part of the capsule well stretched by rolling the fully abducted limb outwards and over-stretching it so that the head of the femur appears in the soft parts of the groin. If the head does not slip in when the adductor bands have all disappeared, the left thumb of the operator is pressed against the trochanter, whilst the thigh is abducted, and pulled vertically to the long axis of the body. After a few trials of this method, the head usually slips in if no adductor bands are present.

Lorenz, in older children, uses a leather-upholstered fulcrum to aid him in reducing the hip, whilst Hoffa places his left forearm beneath the trochanter, and uses it as a fulcrum, and also as a means of pushing the trochanter upwards. When the head is in the acetabulum the hamstring muscles are at once shortened and the knee cannot be extended.

Having stretched the capsule well by means of abduction with rotation, Hoffa lays stress on the necessity of stretching the hamstring muscles, which is done by the assistant gradually straightening the knee, whilst the operator holds the head in position by forced abduction of the thigh. This stretching of the hamstrings makes the head lie in the acetabulum much more easily than it would otherwise do. The leg is then put up in plaster in the abducted position, with slight inward rotation. Lorenz originally advocated abduction with outward rotation, but he has abandoned this position, and now, together with Hoffa and others,

agrees that abduction and inward rotation is the position that gives the most absolute guarantee against a recurrence of a backward dislocation.

The child is allowed to get about on its feet as soon as the preliminary pain has subsided, the boot on the affected side being raised about $1\frac{1}{2}$ inches; in a few weeks the child is able to walk about well. The plaster, if well applied and kept clean, will, as a rule, last six months, and in most cases can then be safely removed, and the child is then allowed to walk with the sole of the boot on the sound side raised about $\frac{3}{4}$ of an inch. The abduction remains marked for a few weeks, but it passes off without any after-treatment.

In treating cases of dislocation of both hips, it has been the custom at the Hospital to treat the better-looking hip, as seen in the skiagraph, first, and at the end of six months to remove the plaster, and then reduce the other hip.

Dr. Lorenz makes a great point of the after-treatment by massage, and special movements, when the plaster has been removed, but I have found that if the head has been kept in good position for nine months in older children, and six months in younger children, they can be allowed to use their legs as much as they like directly the plasters are removed, in most cases without any further treatment. Professor Hoffa, I hear, pursued the same plan with regard to his cases, saying that after-treatment was unnecessary.

On first removing the plaster from a hip that has been reduced for nine months or more, the operator's feelings will be distinctly those of disappointment; the thigh is retained in its position of flexion and abduction, and the child limps away in an ungainly and decidedly worse manner than before treatment. It is at this time that an X-ray photo. will alone convince the operator of the probable success or otherwise of the treatment. The difficulty of properly estimating the length of this flexed and abducted leg, in comparison with the sound limb on the opposite side, the question of the relationship of the trochanter to Nelaton's line, and the question whether the trochanter is as easily pushed up as before all occur to one at this time, but only those who have attempted to honestly answer themselves these questions will know how impossible it is when first releasing one of these limbs to feel certain of the actual result without an X-ray photograph. The one method of examination that has comforted me, when others have failed, is the parallelism existing between the line joining the anterior superior spines, and that connecting the uppermost point on each trochanter, when the head of the bone is properly placed in the acetabulum. The limp that the child shows when she is removed from the plaster may go on for months, and in one of my cases of anterior transposition the marked abduction did not pass off for two years. In a satisfactory case the limp passes off in a few months, but may be noticed even for a year or more after a tiring day.

The length of the limbs, after reduction, should be equal.

The reduction, in a unilateral dislocation, is said to be successful if the X-ray photo shows that the head of the femur has been placed in the face of the cotyloid notch, and in direct contact with it, and that it is on a level with the head on the sound side.

Le Damany says that every dislocation is reducible in the first instance, but in time it becomes irreducible. Failures are due to faulty manipulations or to unsurmountable difficulties, and the best men have to confess themselves beaten occasionally by a dislocated hip. One of the keenest disappointments I have had for a long time was a double congenital dislocation of the hip-joint in a boy of five and a half years. I reduced the hip on one side, after a preliminary tenotomy, without any great difficulty, but twelve months later, when I tried to reduce the second hip, I was unable to get the head forward, although I put all the force I dared to use on three separate occasions. One successful case, in a girl of five years, was not reduced until the third attempt. Damany reports two cases, one seven years, and another eight and a half years, in which he failed after several attempts at reduction. All dislocations become irreducible sooner or later, and few operators will attempt any reduction of a congenital dislocation of the hip after the tenth year in a child.

Dr. Edward Bennett, of the Orthopædic Hospital, Birmingham, however, reports a successful case of reduction at ten and a half years, after extensive tenotomy of adductor and hamstring muscles. Tenotomy of the adductor muscles simplifies the reduction in small children to a minimum; in my last three cases the head of the femur had slipped into the cavity without any trouble directly forcible abduction was made with the left hand behind the trochanter pushing it forward. By using the tenotome a lot of unnecessary bruising is avoided, and the after-pain is considerably reduced, besides simplifying the work necessary for the operating surgeon.

Morphia is usually necessary after the operation, but 48 hours usually sees the end of the pain.

Some children are walking in their plaster in a week; others may take six or eight weeks before they will attempt to walk, but even the most nervous children walk well in time.

I have only had one accident in eighteen operations, and that was in the case of the boy of six and a half, whose second hip I failed to reduce. After the first attempt it was noticed that he did not respond when the sole of his foot on the affected side was tickled, and, on further examination, it was found that he had complete paralysis of the extensors and flexors of toes and ankle, and that the sensation of the leg and foot was almost gone. I concluded that I had bruised or otherwise injured the sciatic nerve. I tested the muscles with the faradic current, and found that all the muscles re-acted well, and, like cases of crutch paralysis, this case recovered completely in six weeks' time. I attributed the mishap to having used the edge of the table to abduct the flexed limb over, instead of my arm, which was aching from the sustained pressure it had had for over half-an-hour. Of the cases whose treatment is completed, a little over 50 per cent. show good anatomical reductions. The others are anterior transpositions, and my present attitude towards this condition is to operate again and try for a true reduction. The anterior transposition replaces a bad form of dislocation by one that is less damaging to the patient. Shortening is present, but it does not progress, and lordosis disappears, but the children will always limp, especially when tired. The leg is everted, and abduction is as limited as in the posterior dislocations.

One of my cases, after having been reduced for four years, fell over a child's tricycle, and redislocated her hip. I did not see the case for six weeks, but it was reduced with the greatest ease, under chloroform, by abduction over the forearm, used as a fulcrum. The adductors, which had rejoined after the first operation, broke away without any trouble, allowing the head to slip forward at once. I removed her plaster in six months, and the child is now walking as well as ever.

SUGGESTIONS FOR THE PREVENTION OF INFECTION IN CHILDREN'S HOSPITALS.

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In considering the prevention of the introduction of infectious diseases into Children's Hospitals, we must realize that the routine methods need not be the same in a small hospital as in a large one. Moreover, the precautions that can be adopted amongst few patients are impracticable at times, where a large number of children must be safeguarded.

I shall confine this paper chiefly to discussing the methods necessary at a fairly large hospital—say, containing one hundred (100) beds, with, approximately, forty (40) members of the nursing staff. Such a hospital would have a large out-patient department, from which many of the in-patients would be admitted, and to which all kinds of infectious cases might daily be brought.

It will be best to commence with the out-patient hall, and to follow the patient to the wards, noting the risks at each stage; and, at the same time, remarking how these can best be combated or avoided.

In the out-patient hall, where, of necessity, patients are detained some time awaiting their turn, the children suffering from all kinds of ailments are liable to be brought into close association in a confined air space. With the provision of a large amount of perflation and ventilation, aerial infection will be minimized. There still remains the spread of infection by direct or indirect contagion. Once the infectious nature of a disease is recognised, a red card to this effect should be given, and the child should again be brought to the hospital only when the symptoms demand it. Treatment may often be given on the reports brought by an adult relative. However, at times, the patient must be seen by the resident medical officer, and for this purpose a separate building is essential, air disconnected from the main out-patient department. Here, in a relatively large and well ventilated waiting room, there will be little risk of spread from one kind of one infectious case to another, for all the guardians of the patients will be aware of the fact that every case is infectious. Such knowledge will be sufficient to prevent much personal contact amongst the children. Still one must remember that there is no antagonism between the infectious diseases; if anything, one predisposes to another, and of mixed infections, the commonest are of scarlet fever and diphtheria. The utter carelessness and ignorance of many adults, in the way they allow the children to chew the cards and books given them, shows that no detail in the methods adopted can be left to the patient's friends.

In this detached building, there will be a consulting and waiting room, and the books or cards must be stored here, and not with those of the other

patients. At a daily fixed hour, the attending doctor and nurse may both wear washable overalls; and, with prompt attention, the patient's stay in the neighbourhood of the hospital may be reduced to a minimum. There must, however, always be the possibility of infection at the first visit, and also from latent cases harboring the virus in a virulent condition, and disseminating it amongst the out-patients at large.

The out-patient medical officers should give especial care to the inspection of throats, and to the remains of rashes, *e.g.*, desquamation, measles stains, varicella crusts; and, in addition, must inquire into the history, and whether there is, or has been, any infectious disease in the house. All cases of bronchitis or pneumonia are suspicious, more especially if the child vomited after the cough; nevertheless, there is no justification for isolating these cases till definite indications of pertussis present themselves.

Prior to the admission of a patient, the previous history must be inquired into, not only that of the child, but also that of the house from which it comes. Also the fullest clinical examination should be made, and then bacteriological examinations of throat, ear, and nose, and of vaginal discharge; purulent conjunctivitis, and discharges from all raw surfaces.

Even the most careful observer may, at the first examination, miss detecting some evidence of an infective disease, or more probably there may be no indications of such. Also, in the case of a child with a slight pharyngitis, or otorrhœa, or vaginal discharge, some hours must elapse in making a culture and smear. Should the child's illness be of a mild nature, it is not so vital; however, in a severe abdominal emergency, it may be essential, to save the child's life, to admit it immediately. With no provision for such cases, save in the general wards, the child remains an out-patient; lacking the constant medical supervision and trained nursing, the case may have a fatal termination, or the patient recovers permanently damaged. Again, the pneumonia associated with measles or whooping cough, in a young child, is an extremely dangerous disease. At the present time, possibly because these cases only occur for a short period of the year, or not at all in some years, no provision is made at the Children's Hospital. Cases of nephritis supervening on scarlatina can be removed to the Isolation Hospital at Fairfield.

It seems necessary, therefore, that a Children's Hospital should be provided with a separate block of buildings as an inspection ward for the temporary reception of new patients. In the construction of such a ward it must be remembered that each case must be protected from every other, as well as care taken to avoid the direct transmission of disease to the wards of the hospital. A good plan would be to erect an isolation block, consisting of several detached groups of single wards, each with no aerial communication with its neighbour, and to each group would belong a separate bathroom and pantry. The advantages of this construction are:—

Firstly, isolation of every patient from all others, more or less completely, and total isolation of groups of two or three.

Secondly, a group of wards may be used at one time for observation purposes; at another for isolation of freshly admitted severe illnesses, associated with an attack of an infectious disease, or of infectious cases that have arisen amongst the in-patients not provided for elsewhere.

Thirdly, as the hospital grows, additional groups might be built on the same plan.

Fourthly, these isolated blocks admit of easy and rapid disinfection.

While the patient is in this ward, which, in the great majority of cases, will not be more than twenty-four hours, the throat swab may be examined for diphtheria, and streptococcal organisms, and any discharge swab for gonococci or streptococci. By that time also the clinical nature of the illness will make itself evident; unless, however, the nurse in charge is careful and proficient, harm might easily result from an inspection ward, for to it doubtful cases will be admitted that otherwise would be observed in the out-patient department. It must be under the charge of medical officers to out-patients, who have no communication with the general wards.

Rarely does infectious disease gain entrance to the wards, save by personal infection, whether the patients themselves—probably the chief factor—by the staff, or by visitors to the hospital.

At odd times, there may be only one medical officer in such an institution, and he must come in contact both with in-patients and out-patients, and thereby might be a possible carrier of infection to the wards. This arrangement is extremely inadvisable, and the indoor medical officer should in no way communicate with out-door patients, who may, or may not, be infectious.

The nursing staff, coming as they do into such intimate contact with the patients, appear at first sight a very real source of danger to the patients. Nevertheless, the donning of the nursing costume would largely minimize this risk, though when an infectious disease has arisen in a ward, they may be the accidental carriers of infection to the other patients till the case is isolated.

In spite of all precautions, a previously non-infected child may be infected, particularly with diphtheria, by parents and other visitors to the wards. What restriction can be placed on such? Recently diphtheria has been prevalent in Melbourne, and some cases developed in the Children's Hospital. In consequence, no one was allowed to visit the patients save the parents and other adults. Notwithstanding this restriction, sporadic cases continued to develop amongst the patients. I doubt if either the general public, or the hospital committee, would agree to the total exclusion of visitors, save under exceptional circumstances. This can be done at an isolation hospital, but not at an institution for general diseases of children.

The visitors should sign a card that they have not been in contact with any case of sore throat, or other infectious disease, nor have they come from a house where such exists. Even then one must regard the visits of relatives and friends as a potent source of infection to the patients.

Thus, from some source, known or unknown, where a large number of children are aggregated together, infectious disease will arise. With the establishment of an inspection ward all suspicious cases may promptly be isolated till the diagnosis is definitely made. Then, in the case of scarlet fever and diphtheria, the child may be removed to an isolation hospital. With other infections, as the contagion took place at the hospital, the children must still be attended to in the hospital, hence a further need for detached single wards.

To shew that this infection not unfrequently arises, I may instance two cases that have occurred at the Children's Hospital this month; one suffering from infantile paralysis had been an inmate for five months, another for six months, suffering from the effects of a burning accident. The latter case had spent most of his time entirely on the balcony, so the possibility of a ward infection was out of the question. Both contracted nasal

diphtheria and were isolated to Fairfield. The theory that these cases harboured the diphtheria bacillus in the nasopharynx for six months is hardly tenable.

Diphtheria is the commonest infective disease arising indoors, and it is against diphtheria we are most prepared. The specific organism is known, and its presence readily detected, whilst as well we have a strong weapon of defence in diphtheria antitoxin. In the case of measles, rotheln, chicken-pox, scarlatina, and pertussis, the resident doctor must rely on clinical evidence to recognise the disease; and, when diagnosed, he has no specific measures to combat the inroads of the infection. He must rely on isolation and disinfection.

The contagiousness of typhoid fever is far more easily combated than is that of those diseases that spread by aerial infection. The typhoid bacilli apparently must be carried in the moist condition to retain their virulence for any appreciable time. Also contamination of food and drink is essentially the mode of infection. This may be produced by human agency, by dust, or by flies.

Every season a few cases of enteric will arise amongst in-patients, and more cases perhaps amongst the nurses and ward-maids. This latter fact strongly suggests that the attendants serve as carriers of infection. The utmost carefulness and cleanliness, combined with full knowledge of the manner of spread on the part of the nurses, would tend to minimise the risk of infection or contagion. Nevertheless, to still further lessen the risk, segregation of all enteric cases is advisable. This has frequently been suggested, and is carried out in some of the continental hospitals. Only good can result from such a procedure.

The case of diphtheria differs from all others in that we have a specific prophylaxis. Nevertheless the administration of diphtheritic antitoxin has its limitations, for only a limited prophylactic value has been established. Dr. Owen Peters—a graduate of our own school, and now of the Nottingham Isolation Hospital—says of it in the *British Medical Journal*: “Sometimes it has been extremely encouraging, at other times a decided failure.”

Considering its limitations, we find that antitoxin is readily and rapidly excreted in the urine, so that the duration of the immunity conferred is short, from two to three weeks. By increasing the dose the duration of immunity cannot be increased. This is certainly a grave objection. With 100 patients regularly in the wards, at least 2,600 inoculations must be done; if the forty nurses are also inoculated this means 1,040 more—making a total of 3,640 injections. The dose would be from 300 to 500 units, so that the annual cost of this procedure would be not less than £300. This is a large sum to be annually expended, and one must be sure that the need demands and the results justify such expenditure.

Against the universal use of antitoxin we must remember that not infrequently when injected, œdema and other local as well as constitutional symptoms of a temporary character show themselves. To children resting in bed this is of minor importance. To the nursing staff it would mean that once a fortnight each would be more or less incapacitated for a day or so from her duties.

Amongst healthy people the inoculation of antitoxin, repeated once a fortnight, occasionally produces alarming symptoms—even horse serum introduced in the same way may be followed by a period of ill-health as serious as the disease against which we are safeguarding the children.

The oral administration may have some good effect in the treatment of septic processes; but the molecule of antitoxin, when acted on by gastric digestion, has its value as a prophylactic destroyed. The third mode of administration, and for some reasons the best—namely by the rectum—is not a practical method for this purpose.

Antitoxin cannot, for these reasons, be regarded as a good or suitable routine prophylactic. Its place is more as a secondary aid in guarding against the consequences of attack. It may even increase the danger of infection by suppressing the evidence of diphtheria, and hence delaying the isolation of the patient. I am aware that injections of antitoxin are given in some American hospitals, with satisfactory results. In a large educational establishment in Melbourne recently diphtheria broke out, and cases occurred one after another. All the throats of the boarders and servants were examined, and two cases of latent diphtheria discovered. These were isolated, as were also all the cases of illness, and the outbreak was brought to an end; showing that bacterial examinations and isolation are adequate of themselves.

Additional precautions must be thought of during epidemics, and under other extraordinary circumstances. If the epidemic be localized, then no patients should be admitted from the affected area, unless it be definitely ascertained that they are likely to be free from infection. Even then admission should be to small wards, and only when the nature of the illness demands it. At these times all visitors should temporarily be excluded from the hospital.

Should several cases arise indoors, then prompt isolation is essential, so that no communication may exist between the infected and non-infected wards; even the nurses should be kept apart. A daily examination of all the children's and nurses' throats should be done to detect the cases as early as possible. Should the outbreak be of diphtheria, then the administration of one or two prophylactic injections of antitoxins to each child is not only justified, but called for to help in limiting the outbreak. Subsequently, after thorough disinfection with cyllin or formalin vapour or spray, the ward may almost at once be again used for the reception of patients. Ward infection seems to count for far fewer cases than infection by personal contact.

The safeguarding of all food supplies, and attention to the general sanitation of the hospital cannot be considered as special measures. Whilst the question whether the hospital should do its own bacterial work turns entirely on the presence or absence of a fully equipped laboratory in the vicinity.

In conclusion I regard the preventive measures of real importance to be—

- (1) Bacteriological examination of all throats, and a thorough clinical examination of the patients prior to admission.
- (2) The establishment of several small inspection wards, with ample cleansing provisions.
- (3) The prompt isolation of all carriers of infection.

Combined with these a periodical, perhaps daily, inspection of all throats of in-patients, for the single examination of a swabbing from every child's throat will not be sufficient. Nevertheless, it will detect the majority of latent cases of diphtheria, and a fresh swab must be made when inflammatory signs demand it.

Restriction must be placed on the visits of parents and friends—for instance, they should certify that they have not been in contact with any doubtful case of illness, also the number of visits should be curtailed.

These methods can systematically be carried out in a large hospital in a city. In smaller institutions, where bacterial methods cannot be done, their place may be taken by injections of antitoxin. It may prevent the attack, at all events it ameliorates the illness. Ordinarily the trouble and expense of antitoxin prophylaxis, and the annoyance and occasional danger forbid it as a routine measure. In an epidemic, however, its use is certainly justified.

When other methods cannot be followed, then the antitoxin method of itself is not adequate; whilst the examination of throats and isolation of infectious cases will keep the spread of infection well in check.

SOME REMARKS ON THE PREVENTION OF INFECTIOUS DISEASES IN CHILDREN'S HOSPITALS.

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Among the many problems connected with the management of Children's Hospitals, one of the most pressing is that pertaining to the prevention of infectious disease among the inmates. From the nature of the precautions adopted in different hospitals, it is apparent that the question is one of universal and profound importance. It is recognised that children are especially liable to infectious diseases, and if any hospital subjects a child to an avoidable risk of contracting such a disease, it not only fails in its duty to the patient, but becomes also an actual transgressor. Owing to the numerous and insidious sources of infection, many of which are unrecognised by the public, it is impossible to attain complete immunity. Much, however, may be done to minimize those risks which every child runs on entering a hospital where there are other children drawn from all quarters of a large city, and where, on certain days of the week, there is an influx of visitors, whose environment—as regards infection—is unknown.

Apart from these risks to the patient, there is also to be considered, from the point of view of the hospital, the expense and inconvenience of disinfecting a large ward, and the dislocation of the service, which an infectious case entails.

The three main channels by which infectious disease may enter a hospital are, in order of importance, as follows:—

1. A child may be admitted during the incubation period, or with unrecognised premonitory symptoms;
2. Infection may take place through visitors, or by means of toys, books, &c., which they bring;
3. Infection may take place through the doctor or nurse.

We will now consider in detail the best means of combating each of these sources of infection. The writer was privileged some three years ago to visit most of the Children's Hospitals in America and Great Britain, and these remarks on the subject under discussion are the net result of observations made in many different centres.

With regard to the first source of infection, when the child to be admitted is brought to the hospital, the temperature should be taken, and a rigid examination made of the throat and skin. At the same time (or better, on the day previous to admission if the case is not an urgent one) a swabbing of the throat should be taken for culture purposes, and the parents or friends closely questioned as to the presence of infectious disease at home, or in the neighbourhood. If the examination has been satisfactory, the child is bathed and dressed in its hospital clothes. If the child during convalescence is to wear its own clothes it is important that these should have been washed or sterilized in the meantime.

At the Toronto Children's Hospital each child, in addition to the ordinary precautions mentioned above, is given a prophylactic dose of diphtheria anti-toxin, five hundred units being given to the smaller, and one thousand units to the larger children. The dose is repeated in three weeks. The same method is employed in the Children's Department of the Post-Graduate Hospital, New York. It is noteworthy that in both these institutions there had been no diphtheria outbreak since the adoption of this precaution. The great objections to it are, that it is unpopular with the patients and their friends, and that it is expensive. Against the latter objection must be urged the cost of disinfection when a case of diphtheria does occur in a ward.

The child on admission should, if the demand for beds is not too great, be placed in a small or admission ward—which should be of one-quarter of the capacity of the main ward—for at least a fortnight. This is ample time for the symptoms of whooping-cough, measles, scarlet-fever, or diphtheria, to develop. If any of these should arise, it is much less expensive, and less troublesome to disinfect a small ward than a large one, and at the same time fewer children run risk of infection. At the end of a fortnight, if no sign of infectious disease has developed, and the bacteriological examination of the throat has been satisfactory, the child is moved into a large ward.

The advantages of this admission ward as a "strainer" for the larger ward are so obvious that it must always have a place in any proper system of hospital construction. Many children are discharged in less than a fortnight, and hence cannot act as a source of infection to children in the larger ward. It is necessary to emphasize the fact that the same nurse should not serve in both wards at the same time.

Secondly, we must consider infection through visitors. In the great majority of Children's Hospitals there is only one visiting day a week, usually Sunday; in one large hospital in the United States no visitors are allowed except in very critical cases. In every case the number of visitors to each patient is strictly limited. In a few cases instructions are printed on the visiting ticket issued to the friends that they are not to see patients if any infectious disease existed at their homes, or in their neighbourhood. At the abovementioned Post Graduate Hospital each visitor had to wash the hands, and then don a white gown provided by the Hospital, before entering the wards.

In our opinion it is impossible to do away with visitors. Parents will not part with their children if they are not to see them for some weeks, or perhaps months. Much, however, may be done in the matter of restricting the number of visiting days and of visitors. One visitor a fortnight to each child should be the rule, except in very serious cases. The wearing of gowns by visitors has much to commend it, but involves expense.

As well as the visiting ticket there should be displayed outside each ward a large placard forbidding visitors to enter the ward if they have lately been associated with any case of infectious disease. No toys or books should be allowed to be brought by visitors, and in no case should old toys, or second-hand books, be accepted as gifts by the Hospital.

With regard to infection by doctors and nurses, we are satisfied that this is a more common source than is commonly supposed. They, more than anybody else, come in contact with the children, and in many cases act as a medium of contagion. No physician or surgeon should visit a Children's Hospital if he had on the same day come in contact with a case of infectious disease, unless he has had a bath and a change in the meantime. It is very important in our opinion that the house surgeon in attendance at the out-patient department should not enter the wards. Very often, owing to a rush of work, or to the absence or illness of his colleagues, he has temporarily to assume another house surgeon's duties, and, in this way, unless extreme care be taken, he may be a conveyer of infection to the patients.

It should be impressed on nurses that they must not visit where there is any case of infectious disease, that they should never wear the same dress in the ward that they wear in the streets, and that they must always carefully wash the hands before going on duty.

To sum up, the results of experience seems to show that while it is impossible to absolutely prevent infectious disease entering Children's Hospitals, yet it is possible to minimize the risk by close attention to the following points:—

1. The careful examination of the child by the Resident Medical Officer at the time of admission to the hospital, and a minute interrogation of the parent and friends as to the existence of infectious disease at or near the child's home.
2. The bathing of the child and the disinfection of its clothes.
3. The injection in all cases of a prophylactic dose of diphtheria anti-toxin.
4. The placing of the children in a small admission ward for the first fourteen days.
5. The notification to visitors that they are not to enter a ward if they have been near any infectious disease recently.
6. The restriction in the number of visiting days and of visitors.
7. The compulsory washing of hands and wearing of gowns by visitors.
8. Extreme care on the part of the doctors and nurses after they have been near any infectious cases.

DISCUSSION: PREVENTION OF INTRODUCTION OF INFECTIOUS DISEASES INTO CHILDREN'S HOSPITALS.

THE PRESIDENT (DR. A. JEFFERIS TURNER) said it was impossible to absolutely exclude infectious diseases from Children's Hospitals. Steps should, however, be taken to minimise the danger as much as possible. Observation wards were desirable, but their construction was limited, as a rule, by want of funds.

Skilled observation at all stages was the chief means of excluding cases of infectious diseases from Children's Hospitals. The chief danger always lies in the out-patient waiting hall. Sick infants should not be taken to a Children's Hospital during an epidemic. A separate room should be provided for cases of whooping cough during an epidemic of that disease, and a skilled nurse might be entrusted with the duty of drafting the marked cases to that room. But the risk would always be present if any of the children were suffering from more than one infectious disease at the same time.

With the administration of anti-toxin to every patient coming to the hospital as a means of prophylaxis he could not agree.

In the observation ward in which patients were kept under observation for fourteen days before admission to the wards, medical and surgical cases had to be mixed together. This was an inconvenient arrangement, besides exposing children with fractures to danger of infection from typhoid and other diseases.

The exclusion of visitors from the wards would help to minimise the risk of outbreaks of infectious diseases, but parents would object strongly to being excluded.

In cases where children are sent to a diphtheria ward before an absolute diagnosis was made by the bacteriologist, a prophylactic dose of anti-toxin must be given.

Dr. D. McM. OFFICER (Melbourne) said that an army of bacteriologists would be necessary to carry out the work suggested by some medical men to absolutely prevent the introduction of diphtheria into Children's Hospitals. He doubted whether visitors ever were carriers of infectious diseases. Servants, nurses, and doctors were just as likely to be the source of infection. The examination of newly-admitted children should not be limited to throats alone, but the urine and fæces should also be examined bacteriologically if we were to endeavour to absolutely exclude infectious diseases.

One case under his charge at the Children's Hospital had the diphtheria bacilli constantly present in the throat for three and a half months.

Dr. LITCHFIELD (Sydney) doubted the advisability of prophylactic doses of anti-toxin in every case admitted. He thought a few days waiting in the surgical ward was desirable, where possible, in the case of children who had to undergo operations. Nurses should certainly have their noses and throats examined in cases of outbreaks of diphtheria in the wards. He was in favour of giving every case of scarlet fever a prophylactic dose of anti-toxin on account of the great liability of these children to contract diphtheria.

Dr. CLUBBE (Sydney) said that as chairman of a committee of management of a Children's Hospital he must insist that suggestions made to minimise the introduction of infectious diseases must be of a practical nature and easy to carry out.

In the new Children's Hospital, in Sydney, they had four small separate wards, each containing eight beds, and all medical cases were detained in these wards for fourteen days before being drafted into the general wards. Every throat is examined bacteriologically before admission, if possible. Only two visitors are allowed to each patient, and children are not allowed as visitors. The suggestion that each visitor should be made to put on a sterile gown would involve the washing of 200 gowns

a week, which was impracticable. With regard to the out-patient department, separate waiting-rooms for different cases of infectious diseases ought to be provided.

Dr. T. S. DIXON (Sydney) said he had charge of a hospital where mothers and their infants were in residence. He had a receiving home where they were kept for fourteen days, and their clothes sterilised before they were admitted amongst the other inmates. Cases of infectious disease when they occur are sent to the infectious department, and from there are sent to the coast. By thus isolating infectious diseases, he was able on several occasions to prevent their spreading amongst the other children. But his constant anxiety used to be the prevention of epidemics of diphtheria. He could not use sub-cutaneous injections of anti-toxin constantly in the case of small babies, so he resorted to rectal injections of diluted anti-toxin after washing out the bowel, giving a child of six months 150 units, and from six months to twelve months 250 units, and a child of five years is given about 300 units. Diphtheria was present in the institution when he took charge of it. He got rid of it by means of isolation. It recurred again and again, and hence the resort to the prophylactic injections of anti-toxin by the bowel. Since he started this means of prophylaxis, he had had no further cases of diphtheria for a period of nearly two years.

Dr. QUICK (Melbourne), speaking of a recent outbreak of diphtheria in the Children's Hospital, said that the nurses' throats were proved to be free from diphtheria bacilli; and he was strongly of the opinion that the children frequently carried bacilli in their noses and throats in a parasitic manner, and that these occasionally became pathogenic.

During a whooping cough epidemic, it was necessary for a resident medical officer to look on every infant suffering from broncho-pneumonia as most likely suffering from whooping cough.

Dr. BENNIE (Melbourne) said that during an epidemic of diphtheria the throats of all children coming into the hospital were examined, and between 20 and 30 per cent. of the children were found to be carriers of the diphtheria bacilli.

Dr. A. JEFFREYS WOOD (Melbourne) said that as long as children came to out-patient departments to be treated for sickness, there would remain a very great danger of spreading infectious diseases. In the case of pertussis, the child spread the disease to other children for at least a week or ten days before it was possible to diagnose that the child had pertussis. Then, again, if broncho-pneumonia developed in a case of whooping cough the spasmodic nature of the cough disappeared, and only reappeared as the child got better. Measles, again, in the catarrhal stage, would easily pass even a very observant nurse, and succeed in spreading the trouble broadcast amongst the other children for some days before the rash appeared.

Municipal authorities should make local provision for the treatment of infectious diseases, and so avoid the necessity on the part of the parents for breaking the law that forbids a person appearing in a public place or institution with a child suffering from an infectious disease.

SPORADIC CRETINISM.

A. JEFFREYS WOOD, M.D.,

Honorary Medical Officer Melbourne Children's Hospital.

Detailed studies of the anatomical changes resulting from the absence of the thyroid gland are not often found, but a case reported in detail by Drs. McCallum and Fabyan, in the *Johns Hopkins Hospital Bulletin*, September, 1907, is one to which special attention may be called.

The child was thirteen years old, and was a cretinoid idiot. She died of broncho-pneumonia, and diffuse hæmorrhagic pancreatitis.

The expressionless face was due to a large amount of adipose tissue. The fat of the abdominal wall was $1\frac{1}{2}$ centimetres in thickness, pale in colour, and œdematous. The pelvis was choked with masses of fat which was also very abundant about the abdominal organs. The adipose tissue was extraordinarily abundant, pale yellowish white, and forming not only a thick layer under the skin, but loading the omentum and other usual depôts. Microscopically the fat was peculiar in occurring in fine droplets in the adipose tissue cells instead of one large drop filling each cell. Repeated efforts to stain mucin in the subcutaneous tissue were unavailing. Two fairly large parathyroids were found at the lower limit of the larynx. Microscopically they were normal.

Two small cyst-like bodies lobulated were found just below and outside the parathyroids. The left was filled with perfectly colourless fluid. They were placed on a level with the cricoid cartilage. Microscopically they showed unquestionable thyroid tissue, although not resembling the normal very closely. The supporting framework of each mass was a dense fibrous tissue, in which were occasional very small alveoli, containing colloid, and lined by cubical epithelium, but most of the stroma was devoid of epithelial cells, and contained only amorphous masses of brown blood pigment. Such were the very scanty remains of the thyroid lobes.

The only other place in the body where thyroid structure was found was in the base of the tongue.

Sections through the root of the tongue taken sagittally in the median line from the level of the foramen cæcum back, showed a considerable nodule of whitish tissue just below the epithelial covering, exactly in the position of the lingual duct. Microscopically, this proved to be thyroid tissue much better preserved than that in the neck, and showed numerous alveoli, containing colloid. Some of the alveoli were irregular in outline, their walls being thrown up into folds so that they assumed a rosette form as in the case of compensatory hypertrophy.

Colloid was present in the larger alveoli, but was not very abundant. This was obviously actively functioning tissue, but was only a nodule about 2 m.m. in diameter, and would have been overlooked had it not been especially searched for.

The thyroid insufficiency must have been very nearly complete in this case, and the need so great that even the tiny differentiable tissue about the rudimentary lingual duct undertook the regeneration as actively as possible.

The hypophysis was somewhat enlarged, and microscopically the cells were seen to be hypertrophied and increased in number.

Rogowitsch and Stieda found hypertrophy of the hypophysis in rabbits from whom the thyroid glands had been removed.

Regarding the osseous system, there was a general retardation of development and of ossification.

Treatment.—Many attempts have been made to implant thyroid tissue in the bodies of sporadic cretins with a view to curing them. Experiments on animals have shown that a better chance of the graft growing is seen where the implanted thyroid has been removed from an animal of the same species rather than from one of another species. Payr, of Griefswald, treated a cretin of five years, in 1905, by transplanting a piece of the mother's healthy thyroid gland into the spleen. The piece was implanted into a pocket made for it in the spleen, and acted as a living tampon for the blood-filled pulp of the spleen. He had previously demonstrated that animals that usually die quickly after thyroidectomy could be kept alive for 300 days by grafting pieces of thyroid into the spleen. Two years after grafting the thyroid into his patient, Payr reported that the child had developed mentally and physically to that of a normal child of seven years, but at the German Surgical Congress held in April, 1908, Payr reported that the child was not progressing as well as at first, and that the ultimate result two years and four months after the operation left a great deal to be desired. In Vienna, at the Gesellschaft, in 1908, Moszkowicz showed a 6-year-old child who suffered from myxoedema when an infant through thyreoplasia. When the child was three months old, he inserted a piece of thyroid 3 or 4 c.c. in size, taken from a patient operated upon for goitre, into the medulla of the tibia. After the operation, the child improved rapidly in general appearance, and the improvement is continuing. Payr and Kocher are both of the opinion that the medulla of bone is preferable in every way to the spleen as the site of future grafts of thyroid. The blood supply is good, and the support afforded the grafts is firmer than that offered by the spleen. The fact that thyroid tissue is found growing in the substance of the tongue, and showing signs of hypertrophy in the absence of the normal thyroid seems to suggest this organ as a possible site for successful grafting.

I grafted a large piece of thyroid removed from a case of exophthalmic goitre into the axilla of a sporadic cretin about two years ago, but it was quickly absorbed, and feeding with thyroid tablets had to be resumed in a few weeks. From a prolonged experience of treating sporadic cretins with thyroid tabloids, I have come to the following conclusions:—

1. That the thyroid must be given regularly, and not stopped during any temporary illnesses.
2. That the increase in weight and height must be periodically reviewed so that the dose can be increased where the normal average gain is not maintained.
3. That the signs of an overdose of thyroid in these cases are:—A rapid pulse rate, sweating, increased salivation, sleeplessness, tremor, irritability, excitement, and extreme nervousness.
4. That the following doses may be taken to be average doses for sporadic cretins at the commencement of treatment:—

| | | | | |
|------------------------|------|-----|-----|---------------------|
| Three months | ... | ... | ... | gr. ss. |
| Six | „ | ... | ... | gr. i. |
| Twelve | „ | ... | .. | gr. ii. |
| Two years | ... | ... | ... | gr. iv. |
| From two years onwards | from | ... | ... | gr. iv. to gr. xii. |

I have always had satisfactory results with Burroughs and Wellcome's thyroid tabloids. Although I have pushed the dose up to gr. xx., and more, I have not been satisfied that the results have justified the large doses.

5. That the results obtained are variable as to the complete restoration to a normal condition of body and mind. In some cases, very little separates the thyroid-fed sporadic cretin from his brothers and sisters, whilst in others there remains a distinct want of mental development.

Reviewing the present condition of the sporadic cretin with this status before the introduction of thyroid feeding, it must be admitted that it stands as one of the greatest triumphs in medicine.

MONGOLIAN IMBECILITY.

A. JEFFREYS WOOD, M.D.,

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This type of imbecility is one of the commonest we find amongst feeble-minded children in Melbourne. In private practice, the medical man seeing many children is certain to have several cases brought under his notice each year. The type is also frequent in the out-patient department of the Children's Hospital and in the asylums.

Dr. C. H. Fennell, of Darenth, defines mongolian imbecility as a condition of ante-natally arrested development, bodily and mental, marked especially by brachycephaly, by a proneness of the tissues to low and chronic forms of inflammation, and by certain characteristic mental features.

Brachycephaly was absent in only one of Dr. Fennell's 21 cases. The face is straight and the occiput steep, making the profile of the mongol a characteristic feature.

The palpebral fissures have an upward slant in an outward direction in most cases.

The epicanthic fold is often broad.

The nose is short and broad in its whole length, with nostrils looking more forward than usual.

Irritation of the edges of lids is frequent, and in one of my cases marked myopic astigmatism was found by Dr. Webster. Nystagmus is often present.

The cheeks are usually flabby and redundant, lending themselves peculiarly to the facial contortions so frequently noticed. A malar flush of the cheeks is common.

With regard to the fissuring of the tongue, that is almost a pathognomonic feature of the mongol of over six years. We never see it in the mongol infant under two years. Dr. Thomson, of Edinburgh, says that the fissuring may occur as early as two years, but usually shows itself for the first time between three years and six years.

The enlargement of the fungiform papillæ of the tongue, however, occurs between the third and ninth month.

Dr. Thomson is inclined to attribute the fissuring of the tongue to the constant habit of tongue sucking seen in this class of weak-minded children, and he says that the greater the habit the deeper the fissuring.

In the infant mongol the laxity of the ligaments of the joints is a characteristic feature, so that the child puts its toes in its mouth and performs other acrobatic feats with ease. This laxity passes off as the mongol increases in years, but knock-knees, flat feet, and scoliosis in older mongols show the results of this laxity which marks the first few years of life.

With regard to the circulation, Dr. Garrod was the first to point out the frequency with which congenital heart affections and mongolism were associated. The cases he reported were nearly all cases that showed clubbed nails and cyanosis, but I have been struck by the number of mongols showing no cyanosis, but in whom auscultation over the heart reveals a loud systolic murmur, usually heard loudest to the left of the sternum, about the third intercostal space.

Many mongol children have to have adenoids removed, and I have frequently given these children chloroform, and find that, in spite of these murmurs, they take the anæsthetic well.

The hands and fingers are usually short and stumpy. The curved little finger is by no means characteristic of mongolism. It is absent in many such cases, and is by no means uncommon in normally endowed children.

The skin is rough and dry in older mongols, but not markedly so in infants.

The mothers all describe them as very good babies. They exhibit the typical facial aspect from birth. They do not stretch out their heads for the breast like normal children, but lie passively on the arm until the nipple is placed in their mouths. They look happy and placid, and do not take things in their hands until well after the sixth month. The tongue is frequently protruded from the mouth, due probably to the shortness of the mouth. They are late in learning to walk; the earliest of my cases to walk has been eighteen months, but as a rule from three years to four years is the usual time.

They are also late in learning to talk, and clean habits are not easily taught.

They are below the average length, as a rule, but they vary even in this feature. About 2 inches short at twelve months is a fair average to expect.

One mongol at four years and three months was $6\frac{1}{2}$ inches below the average height.

Regarding mental development, these mongols are, by reason of their smiles and imitative faculties, all full of much promise as far as education is concerned, but unfortunately the realization of the promise never seems to be fulfilled.

There are various degrees in this form of imbecility, and the higher grade mongols may learn to read and play the piano to a small extent, but, on the other hand, the lowest grade mongol may never learn to talk or acquire clean habits.

Unfortunately we have no method of treating the mongols like we have the cretins. I have tried to improve the growth of the mongols with thyroid feeding, but I have not satisfied myself that the results have been

definite. If I find that the height is considerably below the average, I always give thyroid, but even in these cases I cannot say that I have seen the least improvement to the mental condition.

With regard to the age these children live to, I have seen them die early from broncho-pneumonia or empyema, but a very large number of them live to 20 years, and a few to 30 years, when tubercle proves a frequent cause of death. It is exceptional to see mongols over 30, but there were some much older cases recorded at a discussion in London some years ago.

With regard to causation, little is known about the mongols. I have several times had mongols brought to me, being the last in a family. One was the last of eleven children in 20 years, another youngest of seven children in 15 years. In several cases where the mongol has appeared early in the family, there has been a marked phthisical history on one side of the family, and in one case there was a history of syphilis on one side and a marked phthisical history on the other side. In other cases, I could find no trace of any weakness on either side, and absolutely normal children have been born both before and after the birth of a mongol infant in a family, and to-day Dr. Weigall shows twin children eight months old, one child being well developed and the other a typical mongol.

The *post-mortem* appearance of the mongol brain is not characteristic. As a rule the hemispheres are large and well convoluted, but the pattern of the convolutions, according to Dr. Waterston (*British Medical Journal*, 1901, p. 1701), departs in several respects from the normal. The infantile type of convolutions is frequently retained in both the frontal and parietal lobes of adult mongols. The pia mater is often thickened and found adherent to the cortex at the bottom of the fissures, and not on their surfaces, as in general paralysis. The thyroid occasionally shows signs of sclerotic thyroiditis. The mongol baby is frequently called a cretin, but the following description will prevent confusion.

The *cretin* baby has a sallow (yellowish-white complexion), with puffy eyelids, that swell markedly when the child cries; hoarse voice; dry hair, or no hair on head; large veins showing through the skin; poorly-developed eyebrows and lashes; and poor finger nails; dentition delayed, and fontanelle widely open; nose shows thick alae; the face is puffy, and the general aspect dull and unresponsive. When the child cries there are no tears at first. The tongue is usually protruded through the thick lips, and very thick, so that it is impossible with a spatula to see the pharynx. There are discrete pads of fat in the supra clavicular fossa, and often in the axillæ. Those above the clavicle usually become prominent when the child cries. The length of the child is much below normal. The abdomen is very prominent, and the umbilicus stands out. That is sometimes independent of an umbilical hernia, being simply the fat that is present throughout all the tissues, and quickly disappears on the administration of thyroid. The temperature in the rectum is always subnormal, rarely raising the thermometer above 95 deg. F. The blood count shows a marked diminution in reds.

Shortness of the child, its wrinkled, scurfy forehead, puffy eyelids, thick lips and nose, protruding tongue and pseudolipomata, prominent abdomen, and projecting umbilicus, suffice to diagnose sporadic cretinism. The subnormal temperature clinches the diagnosis.

SUMMARY OF AN EPIDEMIC OF 135 CASES OF ACUTE ANTERIOR POLIOMYELITIS OCCURRING IN VICTORIA IN 1908.

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During April, May, and June of this year an epidemic of poliomyelitis anterior acuta occurred in Victoria, the extent of which far exceeds any previously recorded in the Southern Hemisphere. As the epidemic has only recently subsided, it is too early to draw many very definite conclusions from it, but an account of 135 cases, seen mostly at the Children's Hospital, may not be out of place at this stage.

For much assistance in collecting these cases, I am indebted to the medical staff, both honorary and resident, of the hospital, as without their generous help in forwarding on their cases to me this paper could not have been compiled. Thanks are also due to the bacteriological and pathological departments of the University, especially mentioning Dr. Dane and Messrs. Sayce and Fielder for work done by them.

From a survey of all recorded epidemics of this disease, the outbreak here this year ranks fourth in numerical order—two having occurred in the Scandinavian Peninsula, and one in New York. Time does not admit of my treating any division of this extensive subject in other than a summary manner.

EPIDEMICITY.

The epidemic occurrence of this disease suggests strongly its dependence on some infective agent; many facts revealed during the epidemic support the germ theory. The disease has been spreading widely the last four years. In 1905 it was epidemic in Queensland, in 1906 in Norway and Sweden, in 1907 extensively in New York, and here in Victoria in 1908.

Considering the statistics of the sporadic cases coming to the Children's Hospital during the past decade, and comparing them with this year's epidemic, there is a well-marked uniformity between them. In both types there was a preponderance of male children affected; nearly two-thirds of all cases occurred in the first three years of life; the disease, in both its epidemic and sporadic prevalence, selected the autumn months—March to June—as the period of greatest incidence; whilst in regard to geographical distribution, the majority of cases occurred in children living in the most densely populated suburbs around Melbourne.

There seems to have been no apparent relationship between this epidemic and the undue prevalence or absence of other diseases; nor has there been any allied affection amongst animals during this year, such as have been described in some outbreaks elsewhere. Sanitary conditions in most cases have been very fair, but the majority of cases occurred in those families who, living in small houses, permitted three or four to sleep together in the same room, frequently in the same bed.

As to the influence of meteorological conditions, it has been noticed in past epidemics that the fall of the year is a favorite time for an outbreak to occur, and on several occasions an unduly dry summer, with scarcity of water in the rivers and streams, was regarded with some causal significance. These are exactly the conditions that pertained in Victoria, the outbreak

supervening after an exceptionally dry, warm summer, with a dearth of water in the catchment area such as had not been experienced for many years.

I have much evidence bearing on the question of contagion, but it would serve no useful purpose to detail it in this brief summary. The disease, in my opinion, is contagious, but in a very mild degree. I also believe that the cases of acute encephalitis have a similar causation to that of acute poliomyelitis; the occurrence in two families of a case of each strongly suggests this. There is a family predisposition to the condition in some cases, and recurrence or recrudescence in the same child has occurred. Without committing myself to anything definite, I should think, from observations made during the epidemic, that the incubation period of this disease must be somewhere between three and sixteen days, and that the invasion stage, or the intervals elapsing between the onset of symptoms and the occurrence of paralysis, varies from zero to a week, most commonly from 24 to 72 hours.

BACTERIOLOGY.

In 1905 Geirswold, in investigating the Norwegian epidemics, demonstrated a poorly staining diplococcus in the centrifugalized lumbar puncture fluid—a diplococcus which he thought had something to do with the disease in a causal way, but which, in his opinion, was no longer alive in the cerebro-spinal fluid—was, in fact, in a state of bacteriolysis. I have been fortunate enough in this epidemic to have obtained a lumbar puncture in 26 recent cases. As arrangements for having anything but the ordinary routine bacteriological examinations conducted are impracticable at the present time in Melbourne, I am able to submit a very crude report only when compared with the same class of work done abroad. Mr. Sayce forwards some details which are interesting. In most cases in which cytodagnosis was performed, there was a lymphocytosis, differing from that seen in tubercular meningitis in that a few polynuclear elements were nearly always present. Frequently the centrifugalized fluid showed no cellular elements at all. Seven cases, on cultivating in excess of media to overcome the bacteriolytic effects of the fluid itself, resulted in a growth of cocci, in pairs and tetrads chiefly, giving a pale lemon-yellow growth suggesting the staphylococcus aureus, but differing in some particulars, notably in this—that injection into rabbits and guinea pigs caused no pus production. Direct inoculation of the cerebro-spinal sac with the lumbar puncture fluid itself gave no result. Direct examination of the centrifugalized fluid in smears, in five cases, revealed the presence, after prolonged search, of poorly staining cocci, extra cellular, and generally as diplococci, analogous to the bacteriolysed diplococci described by Geirswold, and from cultural characteristics suggestive of the micrococcus tetragenus according to Mr. Sayce.

From the foregoing, it is obvious that we are unable to demonstrate any organism as the causal agent in this epidemic; but there are sufficient grounds for supposing that the organism isolated—if not the cause—is at least in some way very closely associated with this disease, for it has not been demonstrated in any of the cultures made from the cerebro-spinal fluids of other diseases examined at the bacteriological laboratory in recent years.

SYMPTOMATOLOGY.

In regard to the clinical features, I shall content myself with a short account of the commoner symptoms exhibited before the onset of the paralysis. Most of you have been afforded this morning an opportunity of seeing for yourselves the usual effects, and the most common distribution, of the muscular paralysis; I shall therefore abstain from considering these in further detail. I should, however, consider this paper very incomplete were I to omit a brief description of the varieties of the disease as seen during the epidemic. Generally speaking, they can be grouped under the three headings suggested some time ago by Dr. Fred Batten. In most cases the picture was essentially that which we recognise as acute poliomyelitis of spinal origin. The other two varieties conform to Batten's classification of the cerebral type, and are called polioencephalitis. Of these, one is known as the superior form, because its main incidence falls on the cells of the cerebral cortex, whilst the other affects the basal nuclei, and is termed polioencephalitis inferior. In this epidemic the cranial nerves chiefly affected were the third, sixth, seventh, and twelfth, and, possibly in one case, the spinal accessory. Besides these variations, one case occurred which, from its signs and symptoms, indicated that the brunt of the mischief had fallen on the cerebellum—in fact, conformed closely to that type of disease known as acute cerebellar ataxia. In some instances, so widespread has been the paralytic affections of the spinal type, and so rapid its upward progression towards the base of the brain, without sensory manifestation being evident, that a condition closely analogous to Landry's paralysis has resulted.

It was quite the exception to see a case in which paralysis was the first symptom or sign noticed. In nearly every instance, on close questioning, a definite history of premonitory febrile illness was obtainable. The symptoms characteristic of this premonitory or invasive stage were, briefly—fever, restlessness, drowsiness, irritability, vomiting, constipation, and vague pain. These were all subject to considerable variation; sometimes one or more was absent; often one symptom was unduly prominent, and obscured the others; whilst, in some cases, an entirely different clinical picture was presented, perhaps ushered in with convulsions. Fever was rarely above 101.5° deg., and not often prolonged more than three days; but, on the other hand, I have seen it rise to 106° deg., and, in a few cases, a prolongation of the febrile stage for fourteen days. In most cases the fever has practically disappeared before the onset of the paralysis. General irritability, restlessness, drowsiness, and a tendency to twitch during sleep, even to become delirious, were frequent accompaniments of the fever, and, as a rule, subsided as the latter declined. But this has not been the result in all cases; one child especially I noted, some months later, as being subject to nocturnal tremors and sudden night starts, waking up as if dreaming. Vomiting has been a common initial symptom, rarely more than three or four times, and never very prominent or calling for special treatment. From an etiological point of view, I have been desirous of ascertaining whether the vomiting is indicative of gastric irritation, the result of ingestion of toxins (micro-organic or otherwise), or whether it is simply a local expression of a generalized infection, such as occurs in the initial stages of scarlet fever, measles, and other acute specific infections. I am of opinion, for various reasons, that it is part of the generalized infection, and not due to local irritation. In very many instances slight cough preceded the onset of this disease, and the same suggestions arose that primary ingress to the system was obtained by the air passages. I am unable, so far, to disprove

this hypothesis, nor am I able to support it by further observations. In some epidemics naso-pharyngeal symptoms have been frequent, but in this one they have been exceptional; and the results of the bacteriological examination of the naso-pharynx, in a few cases only, have been of no etiological value.

Pain, almost invariably accompanied by tenderness, has been of common occurrence during the epidemic; indeed, in some cases it has been the predominant feature not only during the stage of onset, but for some weeks—even months—afterwards. It may (and most frequently does) occur, quite apart from any affection of cutaneous sensibility; but in some few cases, especially those in which marked vasomotor disturbance is manifest, a general dulling of sensation, or perhaps paræsthesiæ or thermalgesia, have been noted. Associated symptoms of this nature often incline one to regard the condition more as a polyneuritis than a poliomyelitis; but against this is the apparently capricious selection of muscles affected by paralysis, and the sudden onset. The character of the pain cannot be adequately described, the tender age of those affected in this epidemic precludes any possibility of obtaining a scientific description of it. It seems to affect the child acutely on the slightest movement, and, in many instances, affects apparently normal muscles as well as the paralyzed ones. It is, in some instances, obviously a muscular pain, and in many respects does not differ from the acute myalgic symptoms often noted in influenza, dengue, &c., and ascribed to the action of toxins on muscles. The affected muscles are often exquisitely tender when pressed or squeezed. Some of these vague shooting pains, especially those localized to the sacral region, and frequently reported in other epidemics, may be meningeal in origin, some may be of the nature of Head's referred pains, but to me the most feasible explanation of these pains is that they are due to implication of the muscle sense fibres in the cord as well as the actual motor nerve cells. In support of this I may state that marked pressure on the paralyzed tendo Achillis has failed to elicit pain, showing that nerves of deep muscle sensibility are markedly affected (Abadie's sign) in some portion of their course.

Constipation has been one of the most frequent and persistent symptoms of this epidemic. Diarrhœa has been seen in very few cases. The constipation generally comes on prior to the actual onset of febrile symptoms, but both are often coincident. It may persist for a few days, a few weeks, or even for months. Drugs seem to have little, if any, action, and enemata are often useless, being retained. On rectal examination one notices that the external sphincter offers some resistance to the passage of the examining finger, but its tonicity is rapidly exhausted, and the musculature of the rectum is found to be quite devoid of contractile power, is dilated, flabby, and, in many cases, ballooned with fæces or gas. This hypotonic condition has been noticed in several cases to exist for five weeks. Very often some temporary weakness, or paralysis, of the recti abdominales, aids in the production of the obstinate constipation. In no case was incontinence of fæces noted. Until recently, no mention was made of bladder disturbances in this disease, unless to state that the micturition reflex was never affected. In this epidemic many cases have suffered much from retention, and inability to urinate without severe pain. As a rule, the child passes urine after several hours delay, but many cases have required relief by catheterization. In one case only did there seem to be definite incontinence, the urine dribbling away constantly. The vesical centres recovered very rapidly; a few days to a week generally sufficed for a normal condition to be re-established.

I have noticed during this epidemic that, whereas vasomotor paresis or paralysis, as characterized by coldness or blueness, with perhaps slight œdema of the affected limb or limbs, was marked in one case; another case, almost identically affected as regards motor paralysis, would exhibit none of the symptoms of vasomotor disturbance, the limb maintaining its normal temperature without recourse to any of the troublesome means demanded by other cases. A comparable distinction could be drawn in regard to cases some of which wasted rapidly, whilst others, similarly paralyzed, did not show this to any degree.

I further observed that many cases, in which vasomotor affections were most pronounced, were exactly those in which wasting was most marked, and these combined cases are just the ones in which the prognosis seems, to my mind, as bad as it can be. I do not lay this down as an infallible guide to prognosis, for I have seen cases of wasting with vasomotor disturbances do well, but it seems to me that rapid wasting—that condition of extreme flaccidity—especially if combined with vasomotor paralysis, has but a poor chance of recovery.

As regards the health of the patients, most of them were of previous good health. Some few had suffered from gastro-enteric trouble during the summer, which, in two cases, had not cleared up when the incidence of this epidemic was noted. Another case developed diarrhœa and vomiting coincidently with the onset of poliomyelitis; whilst in a case that died the fatal result was probably brought about in large measure by the preceding gastro-enteritis. Whilst always a difficult disease to exclude, syphilis did not seem to show out conspicuously in the majority of cases, but in an appreciable number there were decided suggestions that some undermining influence was at work; and it is of interest to record that, in two of the cases upon which I performed *post-mortems*, the histological sections undoubtedly showed considerable thickening of the small vessels.

PATHOLOGY.

I can only very briefly touch on the pathology of poliomyelitis, as the time is short. The recent work of Harbitz and Scheele in the Norwegian epidemics has given us an entirely new version of the changes which occur in the acute epidemic disease. Hitherto we have been able to study only those cases of the sporadic disease dying many years after the onset. The radically different pathology in both types again raises the question as to the identity of the two diseases. In some measure the work done by us on cases dying during the epidemic serves to confirm that of Harbitz and Scheele, who found patchy leptomeningitis especially marked in the anterior aspect of the cord, and more apparent near those areas in which the deeper nerve structures were affected. They also found extreme engorgement of the smaller vessels of the pia about areas of the cord in which the deeper structures were unaffected, and they were therefore tempted to conclude that the primary lesion existed in the vessels of the pia—that, in fact, a leptomeningitis of patchy nature preceded in point of time the real nerve lesion, which is essentially injury or destruction of the anterior cornual cells. The process spreads inwards to the cord along the large vessels which enter the anterior median fissure, and by a series of large branches supply the grey matter of the anterior horn almost wholly. The process may therefore be summed up as an inflammatory condition passing inwards from the pia along the vessels, and affecting the interstitial tissue, and then the large ganglion cells which derive their nutrition from these vessels. Although macroscopically I was unable to satisfy myself

as to the meningeal engorgement, the sections, when examined microscopically, showed undoubted pial engorgement, and, furthermore, in both series of sections the vessels are somewhat thickened, a feature which Dr. Dane thinks is, in all probability, due to syphilis. Other changes that will be noted on examining the sections microscopically are engorgement of the small vessels in the anterior cornua, almost total absence of the large cornual cells on one side (this child had one leg completely paralyzed) in the lumbar region, some affection of the cells of Clarke's column, and poor, patchy staining of areas in the anterior cornua. Sections of the paralyzed quadriceps, which, macroscopically, evinced extreme fatty changes, under the microscope bore this out, but also revealed an atrophic condition of many fibres without the fatty changes being apparent. I had sections of the anterior crural nerve made, but, owing to defects in the process of embedding, the sections showed nothing. Other sections were stained, according to the method of Nissl, by Mr. Fielder, but no granules were seen. Dr. Dane supports the findings of Harbitz and Scheele in respect to the widespread character of meningeal engorgement, which, microscopically, exists throughout the cord; whilst in some areas the anterior cornua are thickly infiltrated with small, round cells; the vessels engorged and neuroglial tissue is proliferating.

Sections of the cord were stained for the purpose of demonstrating organisms in the anterior cornua, but with a negative result.

One *post-mortem* that I performed was on a child that had survived an attack of acute poliomyelitis six weeks previously, caught pertussis, developed broncho-pneumonia, and died with cerebral meningeal symptoms. The cortex of the brain showed purulent meningitis, which, on bacteriological examination, revealed an organism identical with one isolated from the broncho-pneumonic area, viz., the pneumococcus.

In concluding my remarks on this branch of the subject, although nothing tangible in the shape of a specific micro-organism has been discovered in this epidemic, the work done has served to strengthen the theory of Buzzard, that the pathological condition in the cord is an inflammation of the interstitial tissues of the central nervous system, due to the presence of micro-organisms or their toxines, probably in the blood (but possibly in the lymph) circulating within the system; and the fact that the grey matter suffers more than the white is explained by the greater vascularity of the former, and the resistant character of the component parts of the latter. If this view be correct, of necessity one is forced to the conclusion which is borne out by clinical experience—that in many cases, in spite of the most skilful treatment, permanent paralysis will remain. The lesion is spinal; its manifest effects are muscular.

DIAGNOSIS.

I regret that time does not admit of my touching on the question of diagnosis, but I should like to suggest, as a profitable line for discussion—Firstly, whether the sporadic and the epidemic diseases are essentially of the same nature; and, secondly, in how far we are able to separate clinically cases of acute toxic polyneuritis from the spinal type of acute poliomyelitis anterior.

MORTALITY.

And now, in conclusion, it is not inappropriate to mention briefly the death rate of this disease. In a study of epidemics, the mortality rate is found to vary considerably—from *nil* to 25 per cent. In the epidemic in Victoria this year the rate is comparatively a low one, six deaths having been recorded out of a total of 137 cases, or approximately $4\frac{1}{2}$ per cent.

SOME GENERAL CONSIDERATIONS ON INFANTILE PARALYSIS.

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In this paper I have endeavoured to give some account of the epidemic of infantile paralysis that occurred in New South Wales at the end of 1903 and beginning of 1904, in respect to clinical manifestations and to methods I have found most useful in the treatment of such cases. I have also referred to such sporadic cases as I have seen from time to time. The 1903-1904 epidemic was widespread over New South Wales, part of Queensland, and, I believe, part of Victoria. As in all previous epidemics, the disease was most prevalent during the summer months, from November to February.

In age, at onset, the cases varied from eight months to thirteen years, but more than 50 per cent. of them originated in the period between eighteen months and three years. In the epidemic cases the symptoms were of a severe type, the child in many cases being seriously ill; the usual history was that the onset was sudden, though in a case that developed the trouble while in hospital there were noted for two days preliminary malaise, anorexia, and rise of temperature of from 1 to 2 degrees. The symptoms came on abruptly, with rise of temperature to 103 or 104, headache, and vomiting, the latter not severe as a rule, three or four times being the maximum. In some, as an initial symptom, there was diarrhoea, not lasting more than twenty-four hours. Some cases arose during the course of one of the acute infections, thus the history was given of the disease occurring during an attack of pneumonia, measles, scarlet fever, or whooping cough.

The most striking sign was tenderness to touch or on movement; on the body being handled and the affected muscles in any way moved the child would scream with pain, and would hold the unaffected parts of the body rigid so as to prevent any undue movement or stretching of the affected areas, thus, if the erector spinae or hamstrings were implicated, one could elicit Kernig's sign, or if the lower segments of the erector spinae were alone affected, one would find a rigidity of the neck muscles, and so meningeal trouble was simulated.

The duration of the tenderness varied from two weeks up to two months, as a rule disappearing in the third or fourth week; it seemed to bear no relation in duration to the severity of the initial symptoms. This tenderness was present in over 90 per cent. of the epidemic cases.

Pain apart from movement, though not so striking, was fairly constant, being present in over 80 per cent. of cases.

The fever in many reached 103° to 104° in the first forty-eight hours, and then generally remained at about 100° to 101°, its subsidence being by lysis; the duration varied from four to ten days.

Sleeplessness was a marked feature in about half the cases, lasting the same time as the tenderness, and probably due to it.

The date of onset of paralysis varied between wide limits, in some cases being present on the first day, in others not for several days; in one case it was not apparent before the fourteenth day; in most it was evident before the fourth day. In one case the paralysis took three days from the first manifestation of it until it was complete; in most cases it was complete in twenty-four hours.

The amount of muscle paralysed bore no relation to the severity of the general symptoms, nor to the date of its first appearance, as both large and small paralyses appeared indifferently early or late. As regards the distribution of the paralysis the legs were affected in nearly every case, either singly or in combination with other parts; the legs were affected singly or in combination with others in 94 per cent., and alone in 54 per cent. The arms were implicated singly in only 6 per cent., and in conjunction with other parts in 36 per cent.

In 2 per cent. the muscles supplied by cranial nerves were affected, viz., those of the face and tongue.

One striking point about the groups of muscles affected was that in the primary paralysis the extensors of the limbs were almost invariably picked out, either alone, or in association with a severe grade of paralysis that involved other groups in addition, and in only one case was a flexor group alone affected, in this the flexors of the foot were picked out.

This does not, however, hold good when the primary paralysis has passed off and the group left permanently affected noted; of course owing to the more frequent involvement of the extensors primarily, the extensor groups were more often left permanently paralysed; but in many cases, where both extensor and flexor groups were affected at first, the subsequent condition showed complete return of function to the extensors, whereas that of the flexors continued in abeyance, or was completely lost; in 28 per cent of those seen afterwards of whom I have notes the flexor groups were the ones left affected.

The psoas-iliacus is but seldom affected, and if so, usually recovers early, a point of much importance to the child from the point of view of subsequent locomotion.

The erector spinae was affected in 10 per cent. of the total; in one case the abdominal muscles were implicated, and this caused a condition of cyanosis and dyspnoea, from which recovery, however, was complete in less than a fortnight.

In the epidemic cases 20 per cent. showed retention of urine; in all the cases but one recovery of the function was complete in forty-eight hours, the exception lasting for seven days. In none of the cases were the abdominal muscles implicated.

The sporadic forms did not differ much from the epidemic, either in mode of onset or final distribution of the affected muscles, the main point of difference being in the acuteness of the symptoms at the time of onset. In the sporadic cases the few children who were seen during the primary attack were not so seriously ill to all appearance, and the initial symptoms of fever and vomiting less severe; the history, too, given of these attacks was similar, apparently less acute at the onset, sleeplessness was not marked, and only in a very small proportion was tenderness a symptom sufficiently striking for the parents to remember. In none of the cases were there any, as is sometimes described, who, while apparently well, suddenly developed paralysis; some parents gave this history, but closer questioning elicited an account of slight illness and "out of sorts" condition for a day or two previously.

The age of onset was much the same as in the epidemic series, the limbs and groups of muscles picked out primarily, and the final permanent distribution also did not differ materially.

Trophic disturbances make their appearance early, as seen by the early onset of coldness and blueness of the limb. Relative shortening of a limb naturally is of later appearance, but may be very evident in the course

of the first year; after this it does not go on so rapidly, in most cases probably not more than would be expected from the disuse of the limb, though in two where there was a fair amount of power left in the leg I have seen a progressive shortening go on for at least three years more than could be accounted for by the loss of function.

Wasting seems to be due mainly to the muscular atrophy, and the subcutaneous tissues do not diminish to any very great extent.

In one case of sixteen years' duration, where both lower limbs were completely paralysed, there were scars of old ulceration on the back of each calf, which had apparently arisen, from the history given, as patches of gangrenous skin, and at the time of examination, on three toes of one foot were small patches of gangrene.

The severity of the initial attack is in no way an indication of the number of muscles that will be involved, nor does the number of muscles primarily involved give any idea of the final amount of paralysis, nor do the trophic changes in the least depend on the amount of muscle either primarily or permanently affected; thus in two of the cases where in the early stages the whole leg was affected, in one case most has cleared up, and the permanent paralysis remained confined to the peronei and the extensors of the foot, whereas in the other the quadriceps and the whole of the lower leg were completely paralysed, in the former the final shortening was nearly three inches, in the latter there was no shortening left at all.

No deaths were noted in my series, but those into which I have been able to inquire seemed to be due to a paralysis of the respiratory muscles. Recovery may be divided into two stages—the first is that of recovery of function by muscles that were only temporarily paralysed, probably as a result of pressure on the anterior horn cells around the seat of lesion by exudation, which was not severe enough to destroy them, but only to temporarily abolish their function; this recovery occurs at a variable time, probably according to the rate of absorption of the inflammatory exudation; thus in a case where the abdominal muscles were paralysed they had sufficient power in ten days restored to allow them to functionate once more, in a case where the facial muscles were attacked, recovery was complete in three weeks; in most the temporary paralysis was fully recovered from in from six to eight weeks.

The other class of paralysis, which may be termed the permanent, is where cells innervating a muscle, or more generally a group of muscles, is in part or wholly destroyed; when wholly destroyed there will be no recovery, when in part destroyed some of the muscle will be absolutely paralysed, while other fibres will still maintain their complete innervation, but are prevented from working by being insufficient in amount to fulfil the function of the whole muscle, as, for instance, where the peronei are not quite completely paralysed, but have not sufficient power to evert the foot, a varus condition ensues. These muscles then with only some fibres unaffected will have two possibilities in front of them, in the one case with proper treatment, viz., if they are prevented from being over-stretched, if they are massaged, and coaxed to active movement with all restraint by opposing muscles removed, they will recover (probably by a process of hypertrophy) sufficiently to eventually take on their proper function; in the other case, where they are neglected, and become over-stretched by the action of their natural functional antagonists, they lose their already small power of contractility and become possibly irrevocably paralysed.

I use the term possibly irrevocably, as it is not yet determined at what time after the initial paralysis one may consider the overstretched muscles (which still have some of their fibres connected to healthy anterior horn cells) to be hopelessly paralysed. Jones, of Liverpool, quotes cases where stretched, apparently hopelessly paralysed muscles recovered under appropriate treatment after a term of seventeen to nineteen years. The same author states that the electrical reaction is no guide as to the possibility of return of function, and Koch has shown that muscles macroscopically and microscopically degenerated have yet been able to regenerate.

In my series the arm has tended more to recovery than the leg, and several cases have recovered completely, and in two all but the deltoid have functionally recovered.

As regards treatment, during the acute attack no drugs seem to have any effect on the progress of the disease.

When the paralysis is established and the acute attack is over, the treatment resolves itself into helping on the recovery of those muscles not permanently paralysed, and these may be divided into two groups; first those where the majority or all the cells innervating them are only temporarily disabled, and where we may expect complete recovery; secondly those where a small number only of the anterior horn cells are left, and where we can expect only a slight return of power not sufficient at first to restore the function of the muscle.

The first group will probably nearly all recover in from six to eight weeks whatever the treatment, except in a few cases where their antagonists or gravity are allowed to overstretch them at once; the latter will remain permanently useless unless much is done to nurse their power and prevent overstretching.

The most important step in the treatment of this and later stages is to prevent the functional antagonists of these muscles from overacting; should the whole limb be paralysed initially it should be placed in some form of splinting or retentive apparatus that will keep it with all the muscles around the joints in a condition of equilibrium, so that no muscles which may chance to recover early will have the opportunity of overstretching those in opposition to them, and further that the action of gravity will not be permitted to act in a similar manner; for instance, if the arm be paralysed, the position of rest for all muscles will be that in which the arm is abducted from the side at an angle of 45 degrees, the elbow flexed at the same angle, the forearm semipronated, and the fingers slightly flexed.

Should a group of muscles only be affected, as, for instance, the peronei, the action of the antagonists would be to cause a varus with some equinus, and the peronei would be overstretched, in this kind one would have to have the foot overcorrected into a slight calcaneo-valgus, so as to allow a free relaxation to the peronei, yet not sufficient to damage the invertors of the foot.

Adoption of this form of treatment will allow recovery from the primary paralysis to this extent that, many muscles will have completely recovered and taken on function, and be acting nearly up to their original strength—weakened only by the period of their disuse, or, perhaps, by the loss of a few fibres—other muscles, either many or few, will be permanently unable to functionate again, owing to the complete destruction of their anterior horn cells, and finally there will be left muscles that show some sign of recovery, but not sufficient to allow them to carry out their original function.

In the first class all that is needed is massage and training in active movements and movements against resistance to allow them to regain their original strength; in the second case treatment must be adopted to prevent the antagonists from becoming the seat of contractures, and so causing deformities.

The third type are of the utmost interest to the orthopaedist, for here judgment has to be exercised as to whether they can be nursed to again take on function, or whether they will need some form of reinforcement to assist their action.

In these our care must be to maintain that position in which they are relaxed, and not permit either opposing muscles or postural conditions adopted by the patient to throw any undue strain on them.

Now, as before, the position in which we must keep the joint, governed by the affected muscles, must depend on the number of muscles involved. If all are affected, the joint is to be kept in a position of equilibrium, if one or two groups only, the opponents must be slightly stretched, and the limb placed in a position of slight deformity that will allow the affected muscles to be relaxed.

The more cases that come under my notice some time after the attack the more I am impressed with the fact that by appropriate treatment, viz., relaxation of the overstretched muscles, a great number of apparently hopelessly paralysed muscles can be made to recover their function, and so the patients' limbs made much more useful by these means alone.

The first main step then is to keep the affected muscles relaxed at all times; the apparatus for each case will necessarily depend on the combinations of the affected groups.

Next, massage is a most important factor in the treatment, and should be commenced as soon as the tenderness of the muscles has worn off sufficiently to permit it, and should be continued indefinitely until the muscles are either proved to be entirely paralysed and past all hope of recovery, or until they have regained their function, and are able to carry out their usual work. This may mean many years, during which massage will have to be used.

Once the muscles have regained some power, steps should be taken to increase this by means of active movements, making the child perform certain definite actions an increasing number of times daily, and when sufficient strength is regained these exercises should be made against graduated resistance.

Electrical treatment does not in any way appeal to me; we know practically nothing about its action, and I feel doubtful that the spasmodic twitch elicited a few times in the course of the application is of any service to the muscles.

In those cases that we have been able to keep under observation and have gained all the return of power we think possible, but where joints are left incapable of fulfilling their function without some outside help, as instruments, the question arises as to what means to adopt to make the joints regain their functional equilibrium without mechanical aid.

The point then that first arises is how long we are to continue massage and postural treatment before deciding that additional measures are needed to attain a useful and functionally complete limb, personally I should say that two years is a fair trial, if we can be sure of the co-operation of the parents. Jones of Liverpool now leaves all tendon grafting operations until the child is five years of age, and those for stiffening the joint until ten years have been reached.

One of the great drawbacks to successful preliminary measures is that the parents will not carry out instructions fully, and will not persevere in the treatment; the feeling that barefoot progression, especially paddling in the sea-water will strengthen the limb is almost ineradicable, consequently temporary lapses in the treatment happen that undo all the good of previous months of care.

For the foot a scheme has been adopted by Jones that may be called a "foot-proof" method of treatment, and consists in removing an ellipse of skin from the ankle in such a position that when the edges are sutured together the foot will be held in an overcorrected position, thus overcoming any tendency to deformity, and keeping the affected muscles in the required relaxed position; unfortunately the ankle is the only joint to which this may be conveniently applied without the risk of prejudicing the future use of the joint. Just sufficient skin should be removed to allow the foot to be slightly overcorrected and to allow the foot, when the scar stretches to come down to a straight position again.

Should we decide that any operative interference to restore the function of the joint is possible, such as tendon grafting, then any deformity that has already arisen should be rectified by tenotomy or tendon lengthening of any contracted tendons, by cutting or wrenching any contracted ligaments or fasciae, and as is often found in cases of equinus deformity where the articular surface of the astragalus from disuse has outgrown the facets on the tibia and fibula and cannot be reduced into place, some bone excision done.

After the deformity has been reduced we should, if possible, allow some weeks to elapse before further operation so as to gain some idea of the possibilities of the affected muscles, and whether it is worth while going on for some time with postural treatment and massage to get further return of power in them; if this is decided in the negative, the following are the propositions to be dealt with:

First, is the muscular power around the joint such as to permit us to hope for a full return of function if we adopt tendon grafting, and can we then expect the joint to be able to carry out its function eventually without the aid of mechanical appliances?

Secondly, when the muscles are so far disorganised that the best we can expect is to get a joint that can be made fixed in the most useful position for carrying out its functions, what is the best method of attaining this, operative or mechanical?

In this second case we must leave it to the parents to decide, and we can give this guide that if the same result can be attained by instruments, and the parents are in a position to renew and alter them from time to time as may be necessary, then instrumental correction will suffice; should the parents be of the poorer class and unable to fulfil the above conditions, the operative stiffening will be less likely to allow of deformities developing later, and the child will be able to carry out whatever occupation it is fitted for without heavy instruments being an additional source of weight to be overcome and work to be done.

Tendon grafting, as a method of treatment, may be said to have passed the experimental stage, and granted a suitable selection of cases, proper care in the steps of the operation, and, finally, most important of all, suitable after treatment to coax the new muscles in the way they should go, success may generally be ensured.

In reinforcing paralyzed tendons care must be taken that undue loss shall not be occasioned to other groups, and so other forms of deformity set up, that it should only be used in those cases where a considerable amount of power exists around a joint, that the transplanted muscle has sufficient power in it to act on the joint in a proper manner in its new position, that it should not be done until all opposing muscles have had their action curtailed by section or lengthening, and that all deformity has been overcome beforehand, and even overcorrected. It must be remembered that this overcorrection should be maintained until the reinforced muscle is acting well, and is able to take on its new function satisfactorily.

Points to be observed in the operative technique are: the reinforcing tendon should be inserted so that the long axis of muscle and tendon is as nearly as possible in one line, and the tendon not running off into its new position at an angle. To insure this the skin incisions should be free and a tunnel made from the proximal end of the incision to the place where the tendon is to be inserted; the tendon sheath should, if possible, be saved intact around the tendon; the tendon should be inserted so as to retain its natural tonicity, should not be either lengthened or shortened. To effect this, the limb should first be placed in a position of equilibrium and then the distance measured from the top of the muscle in the incision to the point where it is intended to cut the reinforcing tendon, then a similar distance taken from the same point at the proximal end of the incision to the tendon to be reinforced will give the position at which the sutures are to be inserted, allowance, of course, being made if an overlapping method of suture is to be employed. The limb is then held in a position that will slightly relax the affected muscles and the suturing then proceeded with so as to throw no strain on them. The limb is retained in this position until the operation is over, and it can be placed in apparatus to retain the same position.

The sutures I use are No. 1 chromic gut.

R. Jones now advocates, wherever possible, to suture the cut end into periosteum, or, if possible, to remove the bony insertion of the reinforcing tendon and insert this in its new position into a groove prepared for it in the bone. This I have done in two children; and believe it to be the most satisfactory method where feasible.

Tendon lengthening by Lange's method by means of artificial silk tendons I have done in four children, using them from the hamstrings to the side of the patella. In one case fair functional results have been attained, and there is promise of good recovery; in the others technical operative faults have rendered them a failure.

Frequently failure results from insufficient care in the after treatment of these cases. The chief points to be observed are, to place the limb in an overcorrected position so as to allow the new muscle every chance to get to work in the new position, to gradually remove the overcorrection as it is found to take on action and place it in a position of equilibrium guarded by instrumental appliances until one is satisfied that it is strong enough to carry out its work without risk of injury or a return of the original deformity. In addition to this must be used massage and movements against resistance, so as to train the muscle and allow hypertrophy to take place.

It may take years of careful treatment before a satisfactory result will be gained, but if the cases have been suitably selected good results will be gained.

Arthrodesis, or operative fixation of a joint will be of use in those cases where the joint is flail-like, or only mechanical means are likely to give support otherwise, and where owing to the social conditions of the patient it is advisable for mechanical supports to be dispensed with.

The joints where it is of most service are the knee and ankle.

The points to be observed are to remove enough bone to insure a broad base for bony union; not to remove so much bone as to encroach on the epiphysial lines, and so cause cessation of growth in the bone; that the joint be fixed and union gained in that position which will give the greatest functional use to the limb.

Jones recommends the age of ten as the minimum for these operations on account of the difficulty of obtaining bony union before this, and I have found it difficult to obtain bony union in the ankle before this age; but have not seen the same difficulty in the case of the knee.

In arthrodesis of the knee joint the disadvantage must be noted that the long rigid bone formed by union of the femur and tibia is extremely liable to fracture.

Tendon lengthening I usually practise by a Z (the down stroke perpendicular and not slanting) incision and suturing of the last half-inch of the divided halves.

Tendon shortening may be done by the same incision and removal of portion of each cut end before suturing.

The following are the conclusions I should draw as to the treatment of cases of infantile paralysis:—

Immediate placing of the affected limbs in some form of apparatus so as to give relaxation to the affected muscles both day and night.

Massage.

If seen late, when deformity is present, reduction of this and maintenance of the limb in a slightly overcorrected position.

Tendon grafting where there is fair muscular power around the joint.

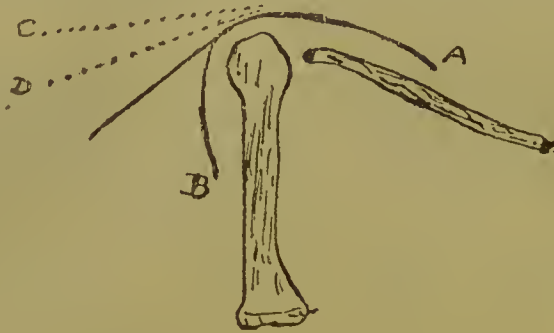
Where tendon grafting is inadmissible, arthrodesis or mechanical support to permit locomotion.

THE TREATMENT OF INFANTILE PARALYSIS.

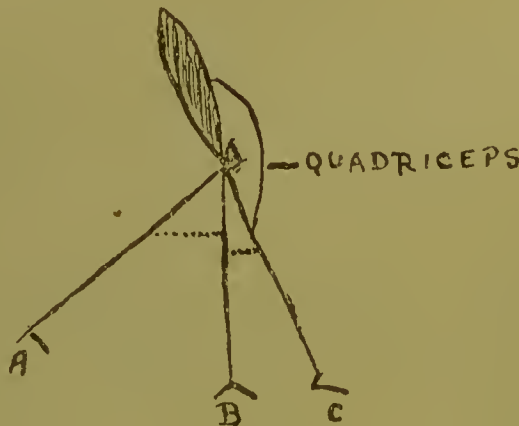
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It is scarcely necessary to refer to the impetus surgery has given to the treatment of this condition. Arthrodesis, tenodesis, and tendon transplantation have rescued many sufferers from a lifelong crutchdom, and the relaxation of over-stretched muscle fibres has shown us that condemned muscles were often recovered ones, but not always. For this we owe a large debt of gratitude to the Liverpool and Heidelberg schools. In the past we have regarded as final the opinion of the pathologist. He has told us that in this disease certain cells were destroyed—that these cells preside over muscular function, and hence there was little or no chance for muscular recovery. We thought too much of the cell, and too little of the muscle. The writer regards the proper treatment of the muscle as

the essential factor, and would hold every case a recoverable one, provided due attention were paid to the resumption of function in the affected muscle. Immediately any muscular weakness is noticed—and the earlier the better—the affected limb or limbs should be immobilized in a splint so that the muscles are placed in a position where they resume function from zero. To take, for example, the case of paralysis of the deltoid with the limb hanging at the side. The function of the deltoid being



to raise the arm to the level A.C., we would ask it to work at the maximum disadvantage, *i.e.*, along the arc B.C.; but, instead, we place it in the zero position A.C., where the work is nil, and in asking it to resume function, we do it from D to C, and not from B to C, gradually lowering the splint as recovery takes place. In the case of the biceps mere flexion does not cause relaxation, for we have the long head in relation to the shoulder joint, and hence it is over-stretched. With the limb hanging, to ask the biceps to contract, we ask a muscle we know to be weak to functionize at the greatest disadvantage. To test a biceps the patient is best reclining with the limb resting on a pillow, and the arm at a right angle. Thus, we bring origin and insertion on a level, and since resistance is least along a straight line, to our surprise a muscle unable to do anything in the flexed or hanging position will be often found to have a large amount of power if



tested in this way. For an upper limb paralysis affecting deltoid biceps, supinators, and forearm extensors, I have introduced the above splint. From a study of ten upper limb cases, I am convinced that the earlier

the application the better the recovery, and of the first four we were able to dispense with the splint in about eight weeks' time. Of these cases, I am dissatisfied with only one result. It is that of a girl about three who had neck, back, and all limbs affected. She was splinted soon after the onset. Eight months later she has recovery in all but the right upper limb, which is far from satisfactory. In the case of the lower limb, a like principle applies. A muscle to be especially dreaded is the quadriceps. Its zero position would be represented by complete extension at the knee C. Therefore, our resumption of function should be from B to C, and not from A to C. It is too much as a test to acutely flex a knee, and ask the child to kick its leg up. The patient is always best reclining, and the first evidence of recovery may be a push from B to C, and not a lift, and on turning the patient on the side to get associated psoas action, the patient may be able, to our surprise, to swing the limb forwards in one piece.

For the lower limb cases, we may use an extended crab splint, by means of which we correct the tendency to foot drop, and keep our quadriceps at zero, and which, as quadriceps recovery takes place, can be flexed



Crab Splint.

at the knee. On the whole, however, in young children with even one lower limb involved, I prefer the immediate use of a double Thomas splint, which can be extended in the form of a crab round the feet, and to which, if necessary, the arm splint can be applied. In this way we give a complete rest to the spinal cord, to my mind a most important part of the treatment. We have our quadriceps at rest, can flex the splint to an angle of 45 degrees to ease the psoas—rest the abdominal muscles, and prevent the rolling out of the femur, with abduction and pelvic tilting, which, once allowed to occur, are rarely recoverable. What this means has been forcibly brought home to me recently in the case of two babies both affected before the twelfth month. Both had lower limbs affected, and abdominal muscles of one side, and neither had treatment for some eight weeks after the onset. The result was pelvic tilting—contracture and apparent lengthening of the bad side of nearly 2 inches. Such cases in later life with their marked scoliosis—dangling limbs and pelvic tilting—are the most pitiable objects one is asked to treat. Their condition is in marked contrast with other cases similarly affected, but treated on the above principles.

In the splint treatment certain points are essential for success:—

- (a) The muscles are immediately placed in a position where they begin work from zero, which really means that origin and insertion are as nearly as possible on a level and in a straight line.

- (b) Splints must be accurately fitting. A badly fitting splint, *i.e.*, one allowing a strong set of muscles to drag on a weaker is a handmaiden to deformity.
- (c) Once treatment is begun, the maintenance of position must be rigidly enforced, the mother being taught how to hold the affected parts when taken out of the splints, and similarly with massage. Failure here renders the whole treatment farcical. When recovery is taking place I never allow kicking in bed with the splint off unless flexion and extension are regulated by means of a leather knee cuff. One frequently sees the child when out of the splint acutely flexing the limb or dangling it over the sides of the table, and similarly with a splint that corrects flexion of the foot, but not eversion or inversion. "Mit der Dummheit kämpfen Götter selbst vergebens."
- (d) Lower limbs should resume function by means of the Thomas caliper, and later a knee-cage with a flexion angle we can increase. Thus we relieve the tendency to genu valgum, strengthen the quadriceps, and support ankles. In the case of the muscles about the ankle, recovery is apt to be unsatisfactory in many cases, nor is the cause hard to seek. Splints are not fitted properly, and mothers take the patient out of the splints and dangle them on a chair, or commence them walking, with the result that weak pivots are asked to support the body weight, and yielding of the ligaments results. When suspicious, I prefer to place the foot in plaster, leaving the dorsum uncovered to encourage dorsi-flexion. With careful attention to all details, I am sure almost all cases will recover, and, of course, contractive deformity be prevented. As in diphtheria, we get cases that neither anti-toxin nor mercury save, so we must get cases where the infective agent meeting little resistance produces a hopeless destruction. In these cases, as Bennie has pointed out, in fatal cases of diphtheria, I think we will find the syphilitic factor playing a not unimportant part.

In cases where recovery has not taken place, the treatment resolves itself under three headings:—

1. Mechanical.
2. Tendon transplantation.
3. Arthrodesis.

In the case of the upper limb, mechanical supports do not help us so much. It is here that nerve transplantation should be useful, although both Jones and Vulpius are pessimistic. With undue laxity of the shoulder, Vulpius' operation of arthrodesis is recommended. It is his most successful arthrodesis operation. With unrecovered biceps, we may transplant or fix the forearm to arm, as Jones recommends, by means of small raw surfaces. In the hand, we may endeavour to take in the slack by means of the Thomas wrist splint, successful even after years of contracture, or may try tendon grafting or shortening of the dorsal extensors. In the lower limb treatment is more hopeful, since the two essential muscles of ambulation are the psoas and quadriceps, one is always justified in trying the effects of three months on the extended crab splint. If no recovery, then I prefer the caliper knee splint first recommended in the *Intercolonial Medical Journal* some two years ago, for even in the

Photo. A.



ILLUSTRATING DR. MACKENZIE'S PAPER.

Case of old standing paralysis, with contractures of 9 years duration. Contractures gradually reduced. Patient now walks with one crutch and caliper splints. His cousin, *æt.* 8, recently presented himself with same condition on left side.



(Z)



Old standing infantile paralysis of both limbs.

(Z)



Same case a week later. Able to walk with caliper splints.

Photo. B.



A case similar to A from South Africa of $4\frac{1}{2}$ years standing.



most extreme condition, on stiffening the knee with cardboard, provided we can get a swing at the hip, we can guarantee ambulation. Cases that have had the splint get along well—a knee-cage can be used in some later—they are saved from a life-long crutchdom, and the parents of all my cases would not hear of operative interference. This would be the biceps and sartorius into the patella or knee arthrodesis.

In the foot, in spite of Kermisson and the French school, tendon transplantation has secured its greatest triumphs, and especially with paralyzed peronei and tibials. The tendon Achilles may be lengthened, dorsal tendons shortened, and if failure, a resort may be had to arthrodesis, aided by a pin through the heel into the tibia, as first recommended by Dr. W. A. Wood, of this city.

Contractures I look on as an indication of the failure to carry out the early treatment previously recommended. Reduce these gradually. In the young, they will all yield. Conservation in paralysis rather than destruction should be the aim. If nature contracts, she will relax, if properly coaxed, and with contracture of some tendons, others are over-stretched. This process is gradual, and nature is best imitated. We may cure the contraction rapidly by operation, but how about the muscular relaxation. Is it cured also? The two processes should be rather *parri passu*. This subject I dealt with in detail last year in the *Intercolonial Medical Journal*, and show photographs of the two cases mentioned in the article.

Such, in brief, are the methods one adopts. Though we received a great impetus in treatment from the operations of arthrodesis, tendesis, and tendon transplantation, these have been the subject at the recent Orthopædic Congress of much destructive criticism. Jones does no arthrodesis now under ten years, and is not so sanguine over tendon work as four years ago. Vulpius, on the other hand, does arthrodesis at almost any age, and the results he showed me, especially in shoulder cases, were excellent. After all, regarding the treatment as essentially medical, and exhausting all conservative and mechanical means before resorting to operation, it is surprising to how narrow a field we will have limited the surgical factor. This paper pleads for the recognition of immediate treatment of the muscle, and an optimism in the prognosis as against that monotonous pessimism works on pediatrics have too long preached.

THE RELATIVE FREQUENCY OF TUBERCULAR DISEASE AMONG CHILDREN IN QUEENSLAND.

A. JEFFERIS TURNER, M.D. Lond., D.P.H. Camb.

Tubercular pulmonary disease is, unfortunately, common in Queensland, but all those forms of tuberculosis which prevail in childhood are rare. Of these two propositions the first is easily demonstrated. Tubercular pulmonary disease, or phthisis, is an affection whose incidence may be accurately gauged from the Registrar-General's reports. From these we learn that the death-rate from this disease per 100,000 mean population was in—

| | | | | | | |
|------|-----|-----|-----|-----|-----|----|
| 1903 | ... | .. | ... | ... | ... | 78 |
| 1904 | .. | .. | .. | ... | ... | 79 |
| 1905 | ... | .. | .. | ... | ... | 76 |
| 1906 | .. | ... | ... | ... | ... | 68 |

The deaths under this heading are analyzed in the yearly reports as regards birth-place and length of residence in Queensland. For instance, in 1906 we have the following table:—

DEATHS FROM PHTHISIS AND TUBERCULOSIS OF THE LARYNGEAL AND PULMONARY ORGANS.

DURATION OF RESIDENCE IN QUEENSLAND.

| Birth Place. | Under 6 months. | 6-12 months. | 1-2 years. | 2-3 years. | 3-4 years. | 4-5 years. | 5-10 years. | 10-15 years. | 15-20 years. | 20 years and upwards. | Unspecified. | Total. |
|-----------------------------------------|--------------------|--------------|------------|------------|------------|------------|-------------|--------------|--------------|--------------------------|--------------|--------|
| Australian States and New Zealand .. | 1 | .. | 1 | 1 | .. | .. | 8 | 5 | 8 | 91 | 5 | 120 |
| Pacific Islands .. | .. | 1 | .. | 7 | 3 | 1 | 7 | 10 | 8 | 10 | 3 | 50 |
| Elsewhere .. | 4 | 1 | 1 | 5 | 3 | 1 | 14 | 10 | 28 | 115 | 9 | 191 |
| Totals .. | 5 | 2 | 2 | 13 | 6 | 2 | 29 | 25 | 44 | 216 | 17 | 351 |

From which we may learn at a glance that the disease is endemic, the proportion of immigrants dying from it within a few years of arrival—that is to say, presumably, the imported cases—being trifling. Rather less than one-seventh of the total is contributed by Pacific Islanders, who are peculiarly susceptible; but after deducting these, the mortality among the white population remains high.

It is impossible to obtain any trustworthy data as to the prevalence of tuberculosis in children from the Registrar-General's returns. This is partly because many of these affections are seldom fatal; but chiefly because the death certification is positively misleading. It is a habit of some medical men, for instance, to certify the deaths of wasted infants as due to "tabes mesenterica," which is classified as a tubercular disease. Probably the certifiers did not mean to imply this; at any rate, the inference is erroneous. Any one who has made *post-mortem* examinations of these wasted infants in Brisbane knows that tubercular disease is very rarely found in them.

The only trustworthy data are those obtained by examining a large number of children and recording the results, and the reports of the Hospital for Sick Children in Brisbane represent the only attempt that has been made in this direction. It cannot be claimed that they are perfectly accurate. A larger number of *post-mortem* examinations in the fatal cases, and more care in recording the pathological diagnosis of all cases might have been wished. Instead, therefore, of taking the reports as a whole, I have taken those for the four years ending June, 1893, as being for the most part the result of my own observation. From each report I have extracted the number of cases diagnosed to be tuberculosis.

Year 1890.—Total in-patients, 533. Tubercular meningitis, 2; spinal caries, 3; tubercular hip disease, 6; total, 11.

1891.—Total admissions, 442. General acute tuberculosis, 2; meningitis (? tubercular), 2; caseous cervical glands, 1; spinal caries, 1; hip-joint disease, 5; total, 11.

1892.—Total admissions, 500. General glandular tuberculosis (an aboriginal), 1; tubercular peritonitis, 2; tubercular meningitis, 1; spinal caries, 5; hip-joint disease, 5; total, 14.

1893.—Total admissions, 585. Tubercular meningitis, 2; tubercular cervical glands, 2; spinal caries, 2; hip-joint disease, 7; total, 13.

No case of tubercular bone or joint disease other than in the spine or hip is recorded in these years. Possibly an isolated case may have been missed; but I can testify that a tubercular knee-joint, for instance, is a curiosity in Brisbane. All that I have seen in twenty years could easily be reckoned on the fingers of one hand. Owing to the small number of tubercular cases they are never refused admission for want of room, as may happen in other cities. A child with tubercular hip, for example, would be at once admitted, and not discharged until cured. So that probably the relative infrequency of tuberculosis in the Brisbane Children's Hospital, as compared with other children's hospitals, is even greater than these statistics suggest.

The following table summarizes the facts in a form convenient for comparison with those of other hospitals, and includes similar data for the year ending June, 1908, showing that tubercular diseases have not increased in proportion of late years.

| Cases of Tuberculosis. | Four Years, ending June, 1893. | | Year ending June, 1908. | |
|-----------------------------|--------------------------------|-------------------------|-------------------------|-------------------------|
| | No. | Per cent. of all cases. | No. | Per cent. of all cases. |
| 1. General and Meningeal .. | 9 | 0.44 | 3 | 0.23 |
| 2. Thoracic | 0 | 0. | 0 | 0. |
| 3. Abdominal | 2 | 0.10 | 0 | 0. |
| 4. Glandular | 4 | 0.19 | 4 | 0.31 |
| 5. Spinal | 11 | 0.53 | 3 | 0.23 |
| 6. Hip-joint | 23 | 1.12 | 7 | 0.54 |
| Total | 49 | 2.38 | 17 | 1.31 |

The easiest way of explaining these facts is the assumption that pulmonary tuberculosis in the adult and tuberculosis in children are different in causation, that the latter is due mainly to bovine bacilli ingested in milk, and that our relative freedom in Brisbane is due, not to the absence of tuberculosis in our milking herds, but to the scalding of the milk necessitated by our hot climate. That this is actually the true explanation I am not prepared to maintain; but it is certainly suggestive.

REPORT ON STATISTICS OF TUBERCULAR DISEASES OF CHILDREN IN THE MELBOURNE CHILDREN'S HOSPITAL.

STEWART W. FERGUSON, M.D.,

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In the following record of tubercular statistics in patients at the Children's Hospital, I regret I can only furnish particulars regarding in-patients, as the out-patient records are not reliable.

The figures cover a period of ten years, and comprise the years 1898-1907, inclusive.

During this time 12,918 cases were admitted to the hospital for treatment, and of this number 1,003, or 7.75 per cent. were suffering from some form of tubercular involvement.

I have subdivided this number under the following divisions:—

| | | | |
|-------------------------------|-----|-----|-----|
| Generalised tuberculosis ... | ... | ... | 212 |
| Joints ... | ... | ... | 377 |
| Spine ... | ... | ... | 149 |
| Phthisis ... | ... | ... | 104 |
| Glands .. | ... | ... | 64 |
| Peritonitis ... | ... | ... | 58 |
| Bones (apart from joints) ... | ... | ... | 25 |
| Kidney ... | ... | ... | 5 |
| Tenosynovitis ... | ... | ... | 2 |
| Cerebral granuloma ... | ... | ... | 1 |
| Unclassed ... | ... | ... | 6 |

Of the total number of 1,003 cases, 250 died in hospital, thus constituting a mortality of 25 per cent.

Of this number, the various forms of generalised tuberculosis claim 194, leaving 56 deaths from localized tuberculosis lesions.

A certain number of generalized tuberculous cases (16) were removed from hospital prior to death, and so are not included in these statistics. Of the remaining 56 deaths, 22 were from phthisis, 15 from peritonitis, 10 from hip, 4 from spine, 4 from glands, and 1 from kidney.

GENERALISED TUBERCULOSIS.

In dealing with dissemination of the tubercle bacillus, I have endeavoured to make a division between tubercular meningitis and the other forms of generalised tuberculosis, at any rate, as far as clinical observation will permit.

In a very large proportion of the meningitis cases, the only other lesion found at the *post-mortem* examination is the focus from which dissemination commenced.

Most commonly it is in the bronchial glands, or, perhaps, the hip or spine, but the only evidence macroscopically is in the meninges.

There is also another class of case in which clinically the symptoms are those of meningitis only, any evidence of dissemination elsewhere being masked by the meningeal symptoms, the other lesions being only found at the *post-mortem* examination. These classes of cases I have grouped under the heading of meningitis.

The pulmonary and typhoid types I have grouped together under the heading of generalized tuberculosis, the former, however, in number greatly predominating over the latter; the latter, in Melbourne, at any rate, being a comparatively rare form of tubercle dissemination in children.

The total number of both in the ten years was 212, of which the meningitis group claim 170, and the generalized 42.

The Meningeal Form.—The statistics as regards age distinctly point to the disease being more frequent in the early years.

Up to and including the age of three, there were 81 cases, or 47½ per cent. This percentage is really greater than the figures represent. For a large number of the years quoted, children were not admitted to the

hospital under the age of two, and a large number of infants with tubercular meningitis were treated as out-patients, whilst practically all older children with this condition were admitted.

The figures in full are:—

| | | | |
|-----------------|-----|-----|----|
| Under 12 months | ... | ... | 14 |
| 1 year | ... | ... | 19 |
| 2 years | ... | ... | 32 |
| 3 " | ... | ... | 16 |
| 4 " | ... | ... | 14 |
| 5 " | ... | ... | 16 |
| 6 " | ... | ... | 12 |
| 7 " | ... | ... | 13 |
| 8 " | ... | ... | 9 |
| 9 " | ... | ... | 8 |
| 10 " | ... | ... | 6 |
| 11 " | ... | ... | 3 |
| 12 " | ... | ... | 4 |
| 13 " | ... | ... | 4 |

This shows fairly clearly the decreasing tendency with advance of years.

Another rather striking fact noted was the marked increase of cases occurring during the last three years, 81, or 51.7 per cent. occurring in 1905-1907. To my mind, there is no doubt this was due to the increased prevalence of measles. During these three years measles was very rife, and I can well remember during my period of residence at the hospital having a series of 25 cases within a few months, every one of which gave a history of measles a few months previously, and all of which had disseminated from a caseating bronchial gland.

Two of the total number of 170 cases recovered, as a result of repeated lumbar punctures. In one tubercle bacilli were discovered in the cerebro spinal fluid; in the other, although no bacilli were obtained, the clinical features left practically no room for doubt. Mortality was consequently 98.8 per cent. As regards the focus from which dissemination originated, exact numbers cannot be quoted as autopsies were not held on all. An overwhelming majority, however, originated from glands, and of these the bronchial group were far and away the most frequently involved. In fact, it was a striking exception in making a *post-mortem* examination to find the bronchial glands uninvolved. Next in frequency were the cervical and retroperitoneal, in that order. A still fewer number originated from a focus in the spine or hip. In four of the series, the primary lesion was phthisis.

The Pulmonary or Typhoid Type.—There were 42 cases of the total 212 which fall under the heading of the pulmonary or typhoid type, and of these, as before mentioned, the pulmonary greatly predominate.

Post-mortem results show the lungs to be the most frequent seat of sowing, a uniform distribution throughout both lungs being most frequently seen, usually accompanying caseous bronchial glands.

The under surface of the diaphragm and the spleen were the next most common situations, in which tubercles were found. I think there is no doubt that the number of cases in this series is considerably underestimated owing to the difficulty of establishing clinically a correct diagnosis. I know of many cases which have been regarded as simply broncho-pneumonia. In children, the onset and course are both often rapid. The clinical picture presented often shows all the features of acute broncho-pneumonia, and the true diagnosis is often only made on the *post-mortem* table.

As regards the age incidence, the same condition of affairs is noted as with the meningitis group, *i.e.*, its much more frequent occurrence in the earlier years. In this series, 43 per cent. of the cases were two years old or under.

JOINTS.

In-patient statistics do not furnish a perfectly true account of the relative frequency of the involvement of the various joints as hips, knees, and ankles, because those joints concerned in locomotion are more frequently admitted as in-patients than shoulders, elbows, or wrists; but at the same time, since the introduction of treatment at the hospital of hips and knees by Thomas splints, very large numbers of these cases are now treated in the out-patient department.

The in-patient statistics show that the hip joint is involved in more than 75 per cent. of the cases, and, although I cannot quote out-patient statistics, but, speaking from a five years almost daily experience there, I can say the figures would probably be further increased by inclusion of out-patient records.

Of the 1,003 cases, there were 377 tubercular joints, and of this number 291 involved the hip joint.

Next in frequency was the knee-joint, while the joints of the upper extremity were comparatively seldom involved.

The exact numbers are as follows:—

| | | | | |
|---------------|-----|-----|-----|----------------------|
| Hip | ... | ... | ... | 286 |
| Knee | ... | ... | ... | 43 |
| Ankle | ... | ... | ... | 10 |
| Tarsus | ... | ... | ... | 11 |
| Pelvis | ... | ... | ... | 6 |
| Elbow | ... | ... | ... | 5 |
| Wrist | ... | ... | ... | 4 |
| Shoulder | ... | ... | ... | 4 |
| Double joints | ... | ... | ... | 7 (including 5 hips) |

SPINE.

In bone or joint tuberculosis the spine is more frequently affected than any other region, with the exception of the hip joint. In the ten years under consideration, there were 149 cases of spinal caries. The dorsal lumbar and cervical regions were affected in that order, while there was one case of coccygeal involvement.

PHTHISIS.

There were 104 cases of phthisis in the list, and this includes those cases of tubercular broncho-pneumonia. Several of these cases were complicated with lesions elsewhere, the combination of spine and phthisis being more frequent than any other.

The diagnosis of this condition in a child is often extremely difficult if the sputum does not contain bacilli. A condition of chronic bronchitis, in which physical signs often persist for months, and which in itself is not tubercular, furnishing the most frequent source of error.

Then, again, there is no doubt that many cases of tubercular broncho-pneumonia running an acute course are regarded as simple, their tubercular nature, like that of the disseminated cases, being only discovered at a *post-mortem* examination.

These are two examples of the difficulty in collecting reliable statistics in the absence of *post-mortem* records.

GLANDS.

The 64 cases recorded must only represent a very small percentage of the cases of tubercular adenitis, as these would be chiefly treated in the out-patient department. The large number of cases of bronchial glands have been omitted, owing to the difficulty of proving their tubercular nature. The frequency of their involvement has been emphasized before.

Apart from these, the cervical group were involved in 70 per cent. of the cases. Next in frequency were the retroperitoneal. As regards age incidence, nothing particular was noticed, the condition being equally common at all ages.

PERITONITIS.

There were 58 cases of tubercular peritonitis, with 15 deaths.

CEREBRAL GRANULOMA.

It is worth while noting that only one case of tubercular granuloma occurred in the series. This is in striking contrast to the figures quoted by McCrae, *Archives of Pediatrics*, April, 1908, who states that in his series tuberculoma of the brain was one quarter as frequent as tubercular meningitis.

THE INCIDENCE OF RICKETS IN SYDNEY.

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When I was asked to write a short paper on the incidence of rickets in Sydney, I complied with pleasure, and was fortunate enough to find, on looking over my old records, that I had some material that would serve the purpose fairly well.

I shall relate my observations categorically, and at the end draw my conclusions.

Observation 1.—From February, 1901, to September, 1902, at a time when I was doing combined medical and surgical out-patients at the Children's Hospital, Sydney, and seeing about twenty-five new cases each week, I made a note of the complaint each child that presented itself was suffering from. In the list I find twelve cases marked as having rickets, three lateral curvature of the spine, and two bow-legs. I may have failed to record some of the milder cases, but on looking up my other records I find my mind was running on rickets at the time, so I do not think I missed many.

Observation 2.—During 1901, 1902, and 1903 I collected seventy children who had been successfully reared on artificial foods. The cases were unselected, and more or less consecutive, and the ages ran from six months to three years. I made a note of their general condition and the food they had been brought up on.

The foods on which the children were reared were:—

| | | | | |
|-----------------------------------------------------------------------|-----|-----|-----|-----------|
| Condensed milk (supplemented in many by biscuits and barley water)... | ... | ... | ... | 35 cases. |
| Cows' milk (supplemented in many by biscuits and barley water) ... | ... | ... | ... | 16 cases |
| Allen & Hanbury's Food | ... | ... | ... | 4 cases |
| Cows' milk and condensed milk | ... | ... | ... | 2 cases |
| Oatmeal water gradually thickened | ... | ... | ... | 1 case |
| Mellin's Food and water | ... | ... | ... | 2 cases |

Of the whole number only four had definite symptoms of rickets:—

- (1) A boy aged two years and ten months, brought up on cows' milk and barley water—always fat and strong—had twelve teeth at twelve months. At present the tibia are bowed outwards, he is fat and healthy and presents no other sign of rickets.
- (2) Child aged one year and nine months, brought up on pure cows' milk, has twelve teeth, is anæmic and sweats about the head; the tissues are soft, and the anterior fontanelle is about the size of a shilling; the ribs are not beaded.
- (3) A boy aged one year and four months, brought up on cows' milk and baked flour; has seven teeth; anterior fontanelle is the size of a florin; his forehead is large and full; he sweats about the head a little; limbs and thorax normal.
- (4) A boy aged twelve months, brought up on humanized milk; has ten teeth; sweats about the head; tissues soft and flabby; anterior fontanelle about the size of a shilling; thorax and limbs normal. He lost the use of his legs two weeks ago, and they are tender to the touch, possibly due to slight scurvy.

Observation 3.—About the same time, with the object of finding out the proportion of rickety cases, I examined every child between the ages of six months and two years that came up for treatment. In this way I collected 124 cases, making notes of the following conditions:—

Age,
 The ribs at their chondral ends,
 The number of teeth,
 Presence of sweating,
 Shape of the thorax and belly,
 Colour,
 Tissue tension,
 Limbs,
 Anterior fontanelle,
 And the nature of the food during the first twelve months.

To simplify matters, I may say that in no case was there any bending of the long bones or enlargement of their epiphyses. In every case a slight even ridge, which I take to be a normal condition, could be felt at the ends of the bony ribs; but in no case was there any bossing or true beading of the ribs. It is interesting to note also that in ninety out of the 124 cases there was more or less sweating about the head. I should say that a moderate amount of sweating was a normal and proper thing in young children, and in the cases under review I did not make out that those who sweated were in a worse state than those who did not.

I gathered also that abnormality must not be argued if the teeth did not appear with text-book precision. For instance, I found it quite common for healthy breast-fed infants of nine months to have no teeth, and it was the exception for a child of twelve months to have twelve teeth.

The following cases were most distinctly rickety of the one hundred and twenty-four:—

- (1) Child aged fourteen months, six teeth, sweating about the head, pale, flesh soft, slight Harrison's sulcus, forehead bulging, brought up on the breast, with extras.
- (2) Child aged fourteen months, four teeth, sweating, pale, soft flesh, large belly, anterior fontanelle almost closed; brought up on the breast, with extras.
- (3) Child aged thirteen months, treated when younger for congenital syphilis, two teeth, sweating, pale, slight Harrison's sulcus, square-looking head, large belly, anterior fontanelle wide; brought up on the breast.
- (4) Child aged one year and seven months, seven teeth, not sweating, slight pallor, flesh soft, slight Harrison's sulcus, not walking, anterior fontanelle the size of a shilling; breast-fed up to nine months.
- (5) Child aged fourteen months, two teeth, sweating, very pale, flesh soft, not crawling, anterior fontanelle the size of a shilling; fed by the breast, with extras.
- (6) Child aged thirteen months, two teeth, sweating, pale, flesh soft, not standing or walking, anterior fontanelle the size of sixpenny bit; brought up on condensed milk.
- (7) Child aged eighteen months, eight teeth, sweating slightly, pale, Harrison's sulcus, flesh soft, anterior fontanelle the size of a florin; brought up on the breast, with extras.

In the list there were a few others with some of the above symptoms, but in a milder form, whom, by stretching the use of the term, one might call rickety, but I think we can let them pass.

Observation 4.—The following are some other cases of rickets that I have seen at odd times:—

- (1) A boy aged four years, had the breast till nine months old; latterly he eats bread and butter, and is fond of meat, but will not take milk foods. Has slight beading of the ribs, the lower ends of the ulna and radius are enlarged in both limbs, the tibia are bowed outwards; he sweats about the head, and is very subject to catarrh of the upper air passages.

Cases of this kind, where there is definite enlargement of the epiphyses of the long bones, are rare in Sydney. I do not remember to have seen more than half-a-dozen such cases, and one was in a child just out from Ireland, and another was in a black child.

- (2) A girl aged four and a half years, thin, but of good colour, ribs slightly beaded, has a shallow groove across the chest and moderate kyphosis when sitting. She sweats rather profusely, and the belly is tumid. According to the history, the teeth were late in appearing.

- (3) A boy aged two years, is backward in walking and talking, has a large square-looking head, fontanelle not closed, flesh soft; he has a marked dorso-lumbar spinal curve that does not completely disappear on suspension or when lying on his belly; there is no rigidity of the spine, however. For a time there was a doubt whether the boy had Pott's disease, but the subsequent history showed that the curve was due to rickets.

Marked spinal curves of this kind due to rickets are very uncommon in Sydney. Lateral curvature of the spine, which I think in most cases is a late symptom or result of rickets, in my experience is also uncommon. I have seen several cases of severe lateral curvature of the spine in girls; but for all that one may attend the medical out-patients at the Children's Hospital, Sydney, for a whole year and not see one.

Observation 5.—The number of children operated on for bow-legs at the Royal Alexandra Hospital for Children, Sydney, during the seven years ending 1907, was twenty-three, or an average of three and a fraction each year.

As the Royal Alexandra Hospital for Children is the only large hospital for children in Sydney, the figures may be taken as a fair indication of the prevalence of the deformity in the city.

Observation 6.—In 1901 Dr. A. Watson Munro published a paper entitled "Statistics of 1,000 consecutive cases of labour at the Women's Hospital, Sydney." (*Australasian Medical Gazette*, 20th June, 1901.)

There were only two cases of deformed pelvis in the whole number, one being associated with an angular curvature of the dorsal spine, and the other due to a bony projection from the sacrum in a multipara. These cases, drawn from the poorer classes, demonstrate clearly the rarity of rickety deformities of the pelvis in women in Sydney. That, too, I think, is the experience of the general practitioner.

Observation 7.—Dr. Gordon MacLeod, Hon. Ophthalmic Surgeon to the Royal Alexandra Hospital for Children, has kindly given me his experience of the incidents of the eye symptoms of rickets in Sydney. He says:—

Horner in 1865 first pointed out the possible connexion between rickets and lamellar cataract, and in recent years it appears to be pretty generally accepted that either the constitutional condition causes the other, or that both are due to a common cause.

The following is from the 1908 translation of Fuchs' Text Book:—

"Lamellar cataract almost always affects both eyes. Its time of origin falls within the first years of life. It is found, above all, in those children who have suffered from convulsions (Arlt). Such convulsions are mostly caused by rickets, and especially by the rachitic changes in the skull (craniotabes). The teeth at the same time are irregularly formed, often being represented simply by cubical or irregular stumps, which are covered unevenly by enamel, or in places are entirely denuded (rachitic teeth). Lamellar cataract, therefore, stands in ætiological connexion with rickets (Horner). Inheritance of lamellar cataract is a not infrequent occurrence."

In 1894 Treacher Collins collected information with regard to the relative frequency of the two conditions in Australia, and came to the following conclusion:—

“To sum up, then, the evidence I have collected goes to show that in Adelaide rickets is a rare disease, and lamellar cataract very infrequent. In Melbourne rickets was, until recently, comparatively rare; that it is more common now, but that the severity of the affection is much less than in the old world; lamellar cataract is exceedingly rare, and the honeycombed condition of the enamel of the teeth is not often met with.

In Sydney, the oldest city in Australia, rickets is said to be as common as in England, but I have no statement as to its comparative severity; lamellar cataract is less frequent than in this country.”

My personal experience of several years' hospital practice in Sydney has been, that the proportion of lamellar cataract in eye work is relatively smaller than in London; that in the majority of cases seen some rachitic signs are present elsewhere, but that the grosser bone changes are generally absent. In several instances two or more members of the same family are affected. I have had recently four members of one family under treatment, and I understand a fifth is similarly affected.

My conclusions are:—

- (1) Rickets does occur in Sydney, but it is not a common disease.
- (2) The disease, when it occurs, is generally of a mild type, enlargement of the long bones being rare in the active stage, and severe deformities of the bones, rare in the later phases.
- (3) The number of cases needing surgical interference is very small.
- (4) Deformity of the pelvis sufficient to obstruct labour is rarely, if ever, seen.

In case any should read this paper who are not acquainted with local conditions, I may say that Sydney is a city of over half a million inhabitants, situated on the shores of Port Jackson, New South Wales, in latitude 33 deg. 51 min. south. The mean temperature is 63 degrees Fahr., and the range between the mean summer and mean winter temperature is 17 degrees Fahr. The rainfall is fifty inches per annum, but it is torrential in character, clear skies and a genial warmth being the prevailing state of the weather.

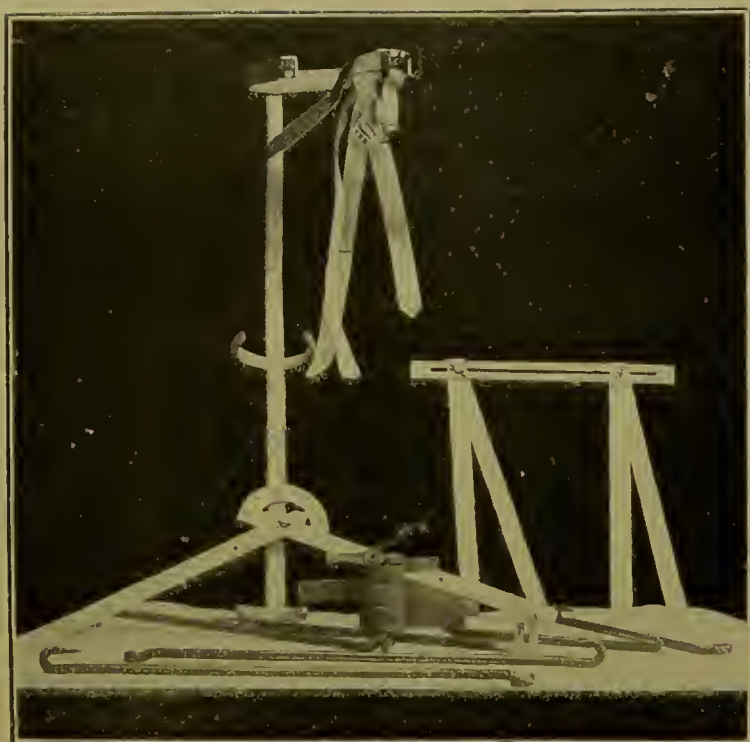
DEMONSTRATION.

Dr. P. B. BENNIE (Melbourne) demonstrated in detail how to take the tracings with strips of lead for the accurate fitting of Thomas' hip splint. He exhibited the apparatus required for measuring in an ordinary case of hip disease, and the apparatus required for fitting the splint, and for further treatment *vide* photograph, and explained the use of the wrenches, goniometer, and lateral displacement measurer. He drew attention by means of a printed slip to some of the common errors in fitting the splint. He showed also how Thomas' splint is used in the improvement of short leg with a stiff joint. In this case, the splint is bent in its own plane, just above the joint, to the angle whose sign is the quotient obtained by dividing the

real shortening by the distance between the centre of motion of the two joints (this distance being usually 5-7ths of that between the two anterior superior iliac spines). The sum of this angle and the adduction gives the critical angle for rotation. When there is abduction and shortening, the difference of the abduction and this angle gives the critical angle. Some photographs were shown in illustration. He mentioned also that the exact amount of abduction necessary for the abduction frame used by Dr. Robert Jones in the operative treatment of short leg, and which could not be found indicated in any of Dr. Jones' writings, can be ascertained in a similar way.

SOME OF THE COMMON ERRORS IN THE USE OF THOMAS'S HIP SPLINT.

1. Applying forces in the wrong places by using the hands instead of the wrenches to alter the curves, or allowing the strips of lead to sag before tracing the curves. This in the chest curve causes inversion of the limb and adduction by contraction of the curve, and excoriation at the spine by dilatation.
2. Making ~~no~~ allowance for the splint approaching the heel after reduction. This causes excoriation at the heel.
3. Applying the splint in recent cases with the knee flexed. This causes abduction or adduction, according as the weight of the limb falls on the outside or the inside of the stem. When the knee is flexed and stiff, the splint must be fitted to the flexed position, and the knee must be first straightened before any reduction of the hip deformity is attempted.
4. Rotating the stem above the buttock curve by torsion over a small area instead of having the rotation uniform. This causes excoriation.
5. Neglecting the increase of deformity which often takes place in acute cases while the splint is being made. This causes increase of the deformity and of the other symptoms. The splint must be fitted to the case at the time it is put on.
6. Neglecting to fit the splint about $\frac{1}{8}$ inch from the spine. This causes excoriation.
7. Having only one rivet at the joints instead of two, this often causes the wings to get soon loose and rotate, thus giving no rest to the joint.
8. Not having the chest wing fitting close to the chest on the sound side. This causes deformity by displacement of the stem.
9. Taking the splint off the patient to alter it after once fitted, and allowing the joint to move. This causes exacerbation of symptoms, and frequent abscess formation.
10. Using the splint for locomotion before the disappearance of all signs of irritation in the joint and before the cure of all deformity except shortening. This causes a return of the disease and increased deformity, and so frequently does the sudden transition from one stage of cure to another.
11. Slinging the splint in the wrong way. This causes lateral displacement of the stem. The splint must always be slung from the sound side.
12. Last but not least. Fitting the patient and then leaving the management of the case to the intelligence of the splint. This causes most of the deformities produced by Thomas's splint.



APPARATUS FOR FITTING THOMAS' SPLINT.

DR. P. B. BENNIE.



SECTION OF EYE, EAR, AND THROAT.

PRESIDENT'S ADDRESS.

SYPHILIS IN OPHTHALMOLOGY.

J. LOCKHART GIBSON, M.D. Edin., M.R.C.S. Brisbane,
President of the Section.

My first duty and pleasure is to thank the Executive of this Congress for the honour done to me and to the State to which I belong by electing me to preside over this section. It is an honour that I prize very highly, though I accepted it with some trepidation. This trepidation was greatly soothed, and my pride in the office not a little increased, by the knowledge that our section was really in the hands of such secretaries, and that their well-known energy and organizing power would ensure its success.

I decided to open a discussion on syphilis rather than read a presidential address, as I hoped that such a course would be of more interest to the section, and knew, in fact, that it would at least be indirectly so by provoking a discussion on so important a subject.

Dr. Fred Bird's address on abdominal syphilis at the Adelaide Congress was, I think, one of the most valuable contributions that Australian medicine and surgery has ever received. It was valuable not only because of the light it threw upon abdominal surgery and abdominal syphilis, but because while emphasizing the fact that many cases of obscure disease in the abdomen are manifestations of syphilis, it implied very forcibly, if perhaps unintentionally, that in other departments of medicine obscure manifestations of this disease are apt to be undiagnosed and untreated. His paper, indeed, suggested to me a desire to collect data from my own case-books, supporting this contention from the ophthalmological stand-point, and raised the hope in my mind that in medicine and other departments somewhat parallel papers might be prepared.

I am keenly aware that I undertake a difficult task in bringing such a subject up in the eye-section, and greatly fear that most of my points will have become such familiar thoughts to those engaged in eye-work that I run a serious risk of being uninteresting, because harping on familiar strings. It has doubtless occurred to each one of you to become conscious of a certain amused tolerance on the part of practitioners who have sent cases for eye examinations on being told time after time that the eye trouble suggests syphilitic taint. This amused tolerance is harmless, if it does not deter a thorough course of the treatment suggested. Unfortunately, however, it often leads to a half-hearted prosecution of treatment, and consequent failure to obtain results. He who complies against his will retains his own opinion still, even though it be merely one of negation.

Eye-work undoubtedly gives special opportunities for diagnosing obscure cases of syphilis, because in the eye we have come to interpret various inflammatory changes of a low type as manifestations of the disease, and almost more frequently than not we are unable to find manifestations in other parts of the body to strengthen our diagnosis. This last fact, combined with very unmerited respect paid to the history of the patient, undoubtedly can explain our occasional failure to impress our views upon our medical colleagues, and in those cases in which we have to admit a distinct doubt even in our own minds we can hardly blame our friends.

It is not, indeed, alone in cases of syphilis that we are given opportunity of "wiping the eyes" of those not engaged in ophthalmology. We get parallel opportunities of diagnosing the toxic effect of lead, of tobacco, of alcohol, and of albuminuria.

Occasionally one notices reports in medical papers of cases one actually itches to put under a course of inunction. The idea, however, is dismissed with the statement, "no history of venereal disease or history of gonorrhœa only, none of syphilis." Sometimes the paper goes on to show that treatment was conducted in spite of a negative history and with satisfactory results.

The impression I have gathered from my own practice is that while a positive history is often, not always, a valuable aid, a negative history is generally without value, and should never be relied upon in the presence of manifestations suggesting the contrary. In almost a majority of cases of obscure ocular lesions suggesting a syphilitic taint one is wiser to omit any direct question as to venereal history to rest content, in fact, with his own examination, and such collateral evidence as he can collect from the patient without unduly raising suspicions. I am referring here not only to those cases where one omits questions for fear of domestic complications. If we desire an opportunity of thoroughly excluding syphilis before abandoning it, we must not enlist the patient against us, and in no class of case is it more necessary to consider, as Moxon wittily puts it, "not only the disease the man has got, but the man the disease has got."

We possess not infrequently an important advantage over other practitioners from the fact that it is possible in the eye to recognise results of treatment more definitely than is often the case when the disease has attacked other organs. And I suppose most of us are still agreed that our diagnosis in obscure cases at least remains unconfirmed until results from active treatment have been observed. I have always myself considered that syphilitic disease in an eye is a local manifestation of a general disease, very often apparently otherwise latent. And it has been my practice to attack the eye condition by means of constitutional treatment, and by that only, except, of course, where conditions such as those requiring the use of a mydriatic complicate the affection.

To attack a local manifestation by general constitutional treatment only is important where we wish to obtain evidence in favour of our provisional diagnosis. A clearing up of a local manifestation after constitutional treatment, and that only, is more likely to be rightly ascribed to the line of treatment employed than if any form of local treatment also has been used.

I do not propose in this paper to consider the possible future value to us, in diagnosis, of the *spirochæta pallida*. I should be interested, however, to know if any of you have found help from a discovery of the *spirochæta*. Amongst other matters in a discussion on the subject of syphilis, I am most anxious for expressions of opinion not only upon the

drug and form of the drug most relied upon by members of our section, but also, and very particularly, on the time throughout which treatment should be conducted. It has been pretty generally accepted for many years that a patient presenting himself for treatment with an early secondary eruption, the most favorable time, I believe, for commencing treatment, should be treated for at least two years in the hope of eradicating the disease as thoroughly as possible, and of minimizing the likelihood of tertiary manifestations in later life.

It has always appeared to me that a patient presenting himself with delayed manifestations, even of a tertiary nature, owing doubtless to absence of previous treatment, or to inadequate previous treatment, should require at least as prolonged treatment as a case caught at the start. Still I have often found it very difficult to induce a patient to follow up treatment for such a period, and even to sustain my own interest in persevering for so long a time, unless, indeed, an initial improvement has been followed by a continuance of slower improvement.

It appears to me that this question of prolonged treatment for syphilis is a difficult one in all departments of medicine. For it is enormously difficult to convince a patient who has lost an early secondary eruption rapidly, together with all other manifestations, to persevere with medicine for many months without to him apparent reason.

I have come to place far more reliance on treatment by mercury than upon treatment by the iodides. And I am always disinclined to give both drugs together by the mouth. We do, I think, occasionally obtain quicker results by giving mercury by inunction, and iodides internally.

In cases where I have been in a hurry to obtain results, mercury by inunction is the drug I have relied upon chiefly, even where the manifestation is a tertiary one. But inunction must be conducted thoroughly and systematically. The patient is to be kept in bed for six days in the same pyjamas, and without bathing; 45 grains of unguent hydrarg. are to be rubbed into a different area of skin each day. On the seventh day a warm bath is to be taken, and, if advisable, a second six days of inunction follow. The drug can generally then be continued by internal administration. Either tabloids of hydrarg. c. creta, or pills of hydrarg. perchlor. are my favourites.

If mercury by the mouth disagrees, or fails in expected effect, inunction can occasionally be used most beneficially for a week or two, and then internal administration of the drug resumed.

It has been my desire always to avoid salivation, to stop short of more than slightly touching the gums, and to keep this up. I give very particular directions regarding brushing of teeth, and always cause either one or two tabloids of chlorate of potash to be allowed to dissolve in the mouth daily. I have never known mercury so administered and required act other than as a tonic. I never on any account keep, and have never kept, a patient in a dark room. Their eyes can be kept in the dark as much as we find necessary, but bodies must have light as well as air.

I fancy many of you will agree with the belief that we can only explain some late syphilitic lesions appearing after middle life, where we have satisfied ourselves that the absence of history is honestly given, by the assumption that the primary lesion has been small and unrecognised; at times, perhaps, concealed by a gonorrhœa, that the secondary eruption has been unobtrusive, and that the robust health of the patient has thrown off all early manifestations of the disease without treatment.

In selecting cases to illustrate my conclusions, beliefs, and practice, I am not endeavouring to produce either a statistical or an exhaustive paper, but rather a series of clinical examples of some of the eye affections I have attributed to syphilis. The chief point of some of my cases will be to show the value of perseverance with treatment.

To commence with keratitis. I have been accustomed to regard all cases of interstitial keratitis as due to syphilitic taint, either inherited or acquired. It has been my invariable practice to treat them actively by constitutional treatment only, and with mercury only, and with no local treatment, except atropin, if required. So satisfactory have I found this course, that, given a case of interstitial keratitis in its early and advancing stage, whether it be attacking one eye or both, I expect a good result and a return to previous acuity of vision even although advance may not be checked until sight has diminished to fingers at 2 or 3 yards, or even less, and although an attack commences in the second eye during treatment. One expects the cornea to clear, if treatment be persevered in, not only in children and adolescents, but also in adults in whom interstitial keratitis is generally a late tertiary manifestation of an acquired taint. In cases resisting mercury internally, or very acute, inunction should be resorted to for a week or two, and then replaced by internal administration of the drug.

I am, of course, speaking of acute interstitial keratitis. When opacities of old standing are found, no doubt local treatment may help their disappearance, but even in such cases I place much reliance upon prolonged constitutional treatment.

To give shortly a typical example of the affection at these three ages, and one or two atypical cases:—

- (a) *Girl, aged fourteen.*—Seen February, 1899. A well-grown girl; well nourished but pale. Neither Hutchinson's teeth nor other stigmata. Left eye had troubled for three weeks; affected with a dense interstitial keratitis. Right eye quite well. Gave hydrarg. c. creta, 1 gr., three times daily. In three months general opacity practically gone. After six months still one small spot of corneal opacity. This spot persisted for about a year. She put on weight and colour, and increased in height. After continuing the drug for fifteen months it was discontinued. A month later the second or right eye developed a similar attack. It was not clear until ten months of further treatment, and in two years and six months after the first eye started each eye saw $\frac{6}{5}$. She has kept in good health since. Her teeth, which were excellent, were not injured in any way by the hydrarg.
- (b) *Lad. aged nineteen years.*—Well grown, pale, and a little thin. No Hutchinson's teeth or other stigmata. Consulted me first February, 1908. Had seen badly with left eye for a week. No pain. Right eye quite good. An iron moulder for two years, exposed to hot fumes. Left eye a large triangular patch of opacity in upper inner quadrant of cornea with a swollen injected base at corneo-scleral margin, and a frosted glass appearance right up to its apex at the centre of the cornea. Its base occupies rather more than quarter of the corneal circumference. In right eye examination found a fine interstitial opacity in upper outer quadrant of cornea with slight pericorneal injection in its neighbourhood. He had three

sisters and one brother all well. He is youngest of family. Was always a strong child. No illness of any description. Sight right eye $\frac{6}{9}$. Left eye $\frac{6}{9}$, and with difficulty 3 of $\frac{6}{8}$. Told likely to be worse before improvement commenced. Hopeful prognosis. Put on hydrarg. c. creta, 1 gr.; soon increased to gr. ii., three times daily, and continued. Eleven days later right eye $\frac{6}{12}$. Left eye not $\frac{6}{20}$. In four weeks and six days he was at his worst, and his right eye counted fingers at 3 to 4 yards. Left eye counted fingers at 1 foot. From this on he improved. Six months after his first visit his right eye saw $\frac{6}{12}$, and his left eye $\frac{6}{8}$. The right has still a small central opacity in the cornea, which will take time to disappear, and accounts for its $\frac{6}{12}$ only of vision.

- (c) *Female, aged fifty-five.*—Healthy-looking, well nourished, and not unusually pale. Possessed of a high degree of myopic astigmatism, which had been corrected years before, with resulting vision right eye $\frac{6}{12}$, left eye $\frac{6}{24}$. A history of inflammatory attack in left eye some years before. Since then right the better eye.

Consulted me in 1901 complaining of seeing floating spots before her eyes. Found very fine vitreal opacities in right eye and some old synechiæ and opacities in pupil of left eye. Vision right eye $\frac{6}{18}$; left eye, $\frac{6}{24}$. Treated with iodide only. Vision came up to $\frac{6}{12}$ in right eye.

Five and a half years later came, then at age of sixty-one years, complaining of having seen badly for a week with her right or good eye. Found it could distinguish no letters at 20 feet, and that there was a fine interstitial corneal opacity with slight pericorneal injection. Gave hydrarg. c. creta, 1 grain, three times daily. In four months vision $\frac{6}{12}$ partly. Continued drug for a year. Cornea became quite clear, and general health improved, and became excellent. Remains of fine vitreal opacities accounted for sight not reaching a higher acuity.

In this case I had a lead apart from the case itself, as I had seen her late husband in consultation some years before, suffering from binasal hemianopsia, due to a lesion in either the outer half of each optic tract, or in the outer half of each optic nerve. He had a clear history of Lues, and was beyond much help from treatment. He was quite blind from optic atrophy before his death.

Female, aged 26 years.—Had been treated for rheumatism because of pains in the ankles, and inflammatory foci in the cornea of left eye, with pericorneal injection. Referred to me because the eye was getting worse, V. $\frac{6}{36}$. Left eye a hazy cornea with a yellowish white interstitial inflammatory focus near its outer margin, and in the neighbourhood of this and practically abutting on it, a swollen patch of episcleritis. The eye was deeply injected. Iris greenish, and the use of mydriatic showed four strong posterior synechiæ. The iritis was, I believed, secondary to the keratitis. Put in a private hospital and ordered mercurial inunction, and atropine locally. Found on my first visit at the hospital a number of indurated cutaneous nodules on plantar surface of insteps and on outer edge of plantar surfaces of feet. After a week's inunction all the induration of these nodules had disappeared, and the aching in her ankles had

practically disappeared. The deep ocular injection disappeared rapidly. The swollen sclerotic and cornea lost their thickness and the focus of inflammation in the cornea cleared. Pupil dilated completely, except at its outer part, where a firm adhesion failed to give. During convalescence she had several single fresh inflammatory foci, little dense white nodules below the surface of cornea, each accompanied by return of pericorneal injection. When she left Brisbane three months after her first visit she had been without fresh nodules for a month, was in very good health, and left eye vision $\frac{6}{9}$. She was instructed to continue the drug, which had, after the first two weeks, been given by the mouth. Her doctor was written to.

We get an indication of what would happen to untreated cases of interstitial keratitis in children in the state of the corneæ of some adults who were evidently not treated seriously during their initial attack. Although some clearing-up of opacity has occurred, much has been left, and sight had been permanently damaged.

In cases of ophthalmia-neonatorum presenting themselves with comparatively little discharge, and with symmetrical central corneal ulceration, I have been accustomed to give hydrarg. either direct to the infant, or through the mother's milk, in addition to bisulphate of quinine lotion locally, and have had reason to believe that it has been the means of inducing healing of the corneal ulcers and restoration of some useful sight in eyes which appeared in the first instance to be doomed.

I have had reason to believe in one case of conical cornea in a healthy young adult that it was a result of inherited taint; followed an initial attack of choroiditis with vitreal opacities, and was controlled in a measure by a long course of hydrarg.

2.—AFFECTIONS OF THE IRIS.

Gumma of the iris cannot be called an obscure affection, and should, of course, always get the benefit of active anti-syphilitic treatment, even if the differential diagnosis is not established until results are obtained.

Syphilitic iritis is, however, often a matter of serious difficulty, because although we are somewhat accustomed to regard plastic iritis as likely to be syphilitic and serous iritis as likely to be rheumatic, experience has taught us that an apparently serous iritis may be syphilitic and an apparently plastic form may be rheumatic.

I speak of rheumatic iritis properly so called, because in my opinion and experience iritis which is not syphilitic is generally rheumatic, and is as truly rheumatic as the joints of a case of acute rheumatic fever. Gonorrhœal iritis in my experience is less frequent than either.

When a case of acute iritis presents itself without a history, it is sometimes a "toss up" whether we treat the case as rheumatic or syphilitic. It is highly important that the diagnosis be made not only quickly but decidedly. My own practice is to obtain as much collateral evidence as possible, and strike hard for the variety which appears to be the most likely. Confinement to bed between blankets and drugged as a case of acute rheumatic fever if the decision is to exclude that variety first; bed and mercurial inunction if otherwise decided. Atropia, of course, in either case. It is quite remarkable how a dense occluding plastic exudation in the pupil will clear entirely if treated actively while acute.

The following case illustrates what I have said:—

Female, aged 28.—Not possible to inquire into history. 9th October, left eye troubling for one week, painful and watering. Deep pericorneal injection. Cornea suggests finest possible deposit posteriorly. Reads $\frac{6}{12}$ partly. Atropia caused partial dilatation, leaving two-thirds of pupil attached to lens. Had suffered from "rheumatism" in a knee, but it did not require medical treatment. To have 20 grain doses of Sod. Salicylat every two hours, up to 120 grains daily, and 6 ophthalmic tabloids of atropin daily. On the next day there was a distinct improvement all round; but on the third day things were less good, and on the fourth day the cornea was distinctly hazy, a dense opacity occluded the pupil, and she could count fingers only. The initial improvement had evidently been due to the atropin only. Put upon mercurial inunction 45 grains Ung. Hydrarg. daily. Improvement commenced at once; four days later the opacity in the pupil had cleared up. Eighteen inunctions were followed by Hydrarg. c. Creta i. gr. three times daily by the mouth, and improvement was continuous. She had no other evidence of specific affection.

3.—CHOROIDITIS WITH OR WITHOUT VITREAL OPACITIES.

If anti-syphilitic treatment fails to improve such cases, it means that to all intents and purposes we will be unable to improve them. The amount of improvement active constitutional treatment often induces is both astonishing and gratifying. Often quite useful and even good sight is restored in spite of the fact that very macroscopic changes are permanently left in the fundus.

We are accustomed to expect results if we detect very fine sand-like opacities in the vitreous admitting of sufficient view of fundus to note absence of macroscopic changes in it. But in these cases, if we are to be sanguine of results we must be sure that the opacities are floating. When many have become deposited as fine or coarse sand-like spots on the posterior capsule of the lens our outlook must be very much less hopeful, as such deposits only clear up partially and sometimes not at all.

The following is a case in point:—

Female, aged 32, unmarried.—Consulted me in March, complaining of seeing badly with her left eye. Right eye a good deal the better. Many headaches for past six months. Vision right eye $\frac{6}{18}$ and $\frac{6}{12}$ partly. Left eye $\frac{6}{60}$. View of right fundus imperfect, because of a number of fine black spots on the posterior capsule of the lens, and a number of fine vitreal opacities. Left eye large floating opacities in vitreous, obscuring even a good red reflection. Has suffered from constipation and "nerves." Trouble probably inherited. Ordered Hvd. c. creta gr. i. three times daily. Headaches disappeared quickly, and general health improved. Eyesight slowly improved in left eye, but hardly altered in right eye. After five months V. right eye $\frac{6}{12}$, left eye $\frac{6}{6}$. Opacities still on posterior surface of right lens, but the large opacities had been replaced in the left vitreous by very fine ones. Weight

had increased by one stone. After seven months opacities on posterior surface of right lens were disappearing, and vision of right eye was $\frac{6}{9}$.

Female, aged 64 years.—Suffers much from headaches. Defective sight in right eye latterly. I had seen her four years previously and corrected her refraction, securing $\frac{6}{8}$ in each eye. 1906. Vision right eye $\frac{6}{36}$, and $\frac{6}{24}$ partly; left eye $\frac{6}{8}$. Finest vitreal opacities in right vitreous; healthy looking. A widow, had brought up a large family. Her doctor knew of no reason for suspecting latent lues. Put on iodide and kept it up for ten months. Sight improved, right eye to $\frac{6}{9}$, left eye to $\frac{6}{5}$ partly. Headaches became less frequent.

Still the case was not quite satisfactory, and even in the left eye there were hints of the finest possible vitreal opacities, in spite of the fact that it saw $\frac{6}{5}$ partly. In consequence of this, and of the persistent opacities in the right vitreous with only $\frac{6}{9}$ of vision in that eye, I decided to give hydrarg. c. Creta i. grain, three times daily. Improvement in health was distinct. Headaches disappeared and sight of right eye came up after a year of hydrarg. to $\frac{6}{6}$, and that of left to $\frac{6}{5}$. The case was one, of course, of long delayed tertiary, and I should have given mercury from the start.

4.—OPTIC NEURITIS WITH OR WITHOUT HEAD SYMPTOMS.

1898—Male. aged 31, married for seven and a half years, no children, one miscarriage. Headaches for two or three weeks, pains at top of eyes, especially the right eye, extending towards back of head. Vision, right eye $\frac{6}{36}$, left eye $\frac{6}{6}$ partly. Optic neuritis in each eye, with fully one diopter of swelling. Partial central scotoma in right eye. No venereal history, no albuminuria. Ordered mercurial inunction. At end of eight days vision right eye $\frac{6}{9}$, left eye $\frac{6}{6}$. Swelling of discs gone, though outlines a little imperfect still. Followed up by hydrarg. internally. At end of a month vision $\frac{6}{5}$ with each eye. Headaches and pain had disappeared quickly. He continued medicine for more than a year, and has kept well.

Female, aged 21 years.—Consulted me three months after marriage with severe muco-purulent conjunctivitis. Suspected of being more than catarrhal. Got well. Consulted sixteen months after marriage. A healthy baby, nursed until lately, aged eight months. Not free from severe headaches for last six months. Has got very thin. Vision $\frac{6}{6}$ partly with each eye. Double optic neuritis with two diopters of swelling in each disc. Put on hydrarg. perchlor. pills. Headaches disappeared during first fortnight, and optic discs cleared up. Husband seen afterwards and his history confirmed the diagnosis, although he had never been treated.

In the following case the eyes gave valuable information of hereditary taint inducing gummatous exudation at the base of the brain:—

Boy, aged eight years. History of having been ill for more than two weeks, with vomiting, headache, and internal squint. Marked neuro-retinitis in each fundus, with several diopters of swelling in each disc, and some small hemorrhages. There may have been slight paresis of the left external rectus, but the strabismus was greatly in excess of what could be accounted for by this, and appeared to be due to spasm of the internal recti. Vision, right eye $\frac{6}{36}$, left eye, $\frac{6}{12}$.

Queensland children below the age of eight years with marked optic neuritis, and paralysis of an external rectus are generally the subjects of plumbism. This case had more ordinary headache than the lead cases and far more vomiting, also I was not satisfied that the squint was a parietic one. He had no other signs of lead and had no blue line, neither did he bite his nails. Had he been an adult he would have been put on hydrarg. at once. I decided, however, although I doubted lead, that the safest course would be to exclude it by treatment in the first instance, rather than risk adding another metal to a plumbic case. Although this proved a false scent, the child did not ultimately suffer, and some knowledge with regard to the relative value of iodide and mercury in gummatous meningitis was gained. He was put on five grain doses of iodide three times daily, and pilocarpin hypodermically to the extent of its physiological effect. He became more comfortable, and suffered less from headache, but vomitted occasionally and had one convulsion. The left corner of his mouth became drawn up a little. His optic neuritis did not diminish, and his squint remained the same, and appeared to be entirely due to overaction of the internal recti.

I am rather ashamed to confess that this treatment was persisted in for nearly three months. It did little but retain him in *statu quo*.

Pilocarpin was then stopped, iodide continued, and mercurial inunction added 15 grains of the blue ointment daily. Improvement commenced at once. A month later optic neuritis had almost disappeared, leaving large pale discs. Strabismus was less marked, and corner of mouth less drawn. A month later still neuritis had disappeared, strabismus had also disappeared. Mouth was straight, and his vision was, right $\frac{6}{36}$, left $\frac{6}{6}$ partly. The child was, in fact, fat and well. I fancy that you will agree with a diagnosis of gummatous exudation at the base, and that mercury proved its superiority to iodide even when this last was combined with pilocarpin.

Another more decided case of gummatous exudation was admitted to the Hospital for Sick Children at about this time.—

Boy, aged five years.—Ailing for three weeks. Said to have been feverish, though not found to be so on admission. Vomits every second day independently of food. Occasional pains in arms, intense frontal headache for three weeks, which has been worse for the last twenty-four hours. Constipated. Abdominal pain on one day, no strabismus, and pupils react to light. Child very dull, but speaks when roused and spoken to. Can distinguish objects and can move his eyes in all directions. Pupils became unequal after admission. Intense optic neuritis in each disc, with four diopters of swelling in right, and two and a half diopters of swelling in left disc.

Ordered mercurial inunction with iodide internally. In two weeks the swelling in right disc was much reduced, and there was no swelling in left disc, which was, however, atrophic. In two months the child was well mentally and physically. There was no swelling in either disc. Right disc was too pale, and in a state of partial post neuritic atrophy. The left was atrophic. Can distinguish small objects with his right eye, appears to have no sight with his left eye.

A case of choroido retinitis.—

Female, aged sixty-eight.—Seen in consultation. Had brought up a large family of healthy children. Husband alive and older

than herself. She herself well nourished. Vision much reduced. Fingers at two feet. Right eye small hæmorrhage at macular region. Numerous retinitic spots around and at macula. Left eye numerous retinitic spots around and at macula. No hæmorrhage. No albumin. We decided to put her on hyd. c. creta. gr. i. three times daily. Steady improvement in health and in sight occurred. In one month vision $\frac{6}{36}$ with each eye. Two months later $\frac{6}{12}$ partly with each. Left eye slightly the better. In good health, and an excellent appetite. Six months later improvement maintained. Continuing hydrarg. The numerous patches in fundus are still very evident. They are pale, apparently owing to atrophic choroid covered by retina.

I have not alluded to ophthalmoplegia externa. This generally gets the benefit of the doubt and anti-syphilitic treatment. One case, however, where it occurred as an early secondary manifestation in an old man, appears worth including. It really diagnosed his case.

Aged sixty-eight, was seen in consultation because he complained of double vision and some pains in the back. These had existed for two days. Had to keep left eye shut because of diplopia. We found in his left eye paresis of the levator, superior rectus, internal rectus, and inferior rectus. No optic neuritis. He denied any venereal history. We made his back an excuse for stripping him, and found not only an unmistakable secondary macular eruption, but also a hard chancre on his prepuce.

He persisted in his denial, but his ophthalmoplegia and diplopia rapidly disappeared under treatment, as well as his macular eruption.

Ophthalmoplegia externa as an early secondary manifestation must be very rare.

THE RELATION OF INTERSTITIAL KERATITIS TO SYPHILIS.

JAMES P. RYAN, L.K.Q.C.P.I.,

Surgeon to Victorian Eye and Ear Hospital.

Owing to severe illness, I have been unable to prepare a paper under the above heading, which it was my intention to read to the members of this section of the Congress. I wished to show that in the vast majority, if not in all cases of interstitial keratitis, that is, keratitis beginning in the middle lavis of the cornea and throughout its course mainly affecting the deeper tissues of that structure, the cause is syphilis, and generally hereditary syphilis. I also intended to go even farther than Jonathan Hutchinson does, in an endeavour to show the value of certain peculiarities in the shape and structure of the teeth, as evidences of hereditary syphilis. He implies, if he does not implicitly state, that in this respect little or no value can be attached to abnormalities of the milk teeth, and that even among the permanent ones, our attention must be mainly directed to the size and shape of the incisors. Notwithstanding the great respect which I entertain for so distinguished a syphilographer as Hutchinson, I hoped to be able to prove that close observation of the condition of these teeth in association with deviations from the normal in the shape and markings of the head and face, and peculiarities in the shape and structure of the

permanent teeth, other than the incisors, can afford us valuable information as to the presence in any particular case of hereditary taint. Finally, I was to make an endeavour to establish the following proposition:—That deep-seated, prolonged keratitis, occurring mostly in young people, generally attacking both eyes, and not due to injury, is always caused by syphilis.

DISCUSSION.

Dr. E. RYAN (Melbourne) agreed that the injury caused by syphilis was enormous, but finds difficulty in classifying certain cases. The trouble arises not in cases where there is a recognised taint, but in cases of, for example, iritis, where one does not get much improvement. The patient gets no better, no worse. Those are the cases which cause the anxiety; the case of a family where one is tainted; the children above and below are healthy; neither teeth nor anything else lead you to suspect syphilis. The interstitial cases do not puzzle; it is rather cyclitis, with vigorous denial of a specific history. He had a case of a girl with no stigmata of syphilis, but with marked interstitial kerato-iritis, in every way like kerato-iritis seen late, closed pupil, and diminished tension. The patient was kept under mercury for twelve months. During the whole of the time the vision of the eye remained down; then at the end of twelve months improved a little. There was an increase in body weight to the extent of a stone and a half. The other eye was attacked with most virulent iritis, and after fifteen months the tension went down to -3; then suddenly rose. The pupil was kept open by atropin, 8 grains to an oz., thrice daily. She got an attack of acute glaucoma, and he had to excise the eye. The father is living, 85; the mother living, 72. Nine in family, all living. Four younger than she is, all healthy. The girl was perfectly healthy before this. Other cases sometimes do improve under mercury; but it is not the cases that improve under mercury, it is the cases that do not improve that cause anxiety. A case of interest showed unilateral cyclitis, vitreal opacities, and serous iritis in one eye. Nine months' use of mercury effected no improvement. In episcleritis fugax, the attacks go off themselves. In sclerotising keratitis, mercury is often ineffective. There are cases of cyclitis where hereditary gout plays a part, resembling specific cases, yet no treatment seems to be of much avail. He had a case in mind, of a man who did not seem to improve in any way, yet he denied most strongly the possibility of any infection.

Dr. PABST (Auckland) was quite in accord with everything Dr. Gibson said. His experience of this year rather pointed to tubercle as a factor in some of these iritic conditions. He had four cases now of undoubtedly tubercular iritis. One case he would quote because it bore on the point raised by Dr. Gibson, that interstitial keratitis is almost always syphilitic. A married woman was sent by a practitioner with a lesion which was diagnosed as interstitial keratitis due to syphilis. She had been treated for twelve months for hereditary syphilis without improvement. Calmette's reaction gave positive indication. He wired down to her doctor that now he thought the case was tubercular. Her doctor said that she had been treated by him for phthisis three years before. The case was put into hospital, and was quite well in eight weeks. When he first began practice, he saw a patient with an error of refraction, a woman of forty-two, married. He corrected the refraction, and then lost sight of her, but heard of her for about ten years as a gynaecological

patient, as a neurasthenic patient, as being treated by the Weir Mitchell, as having been home to England, and travelled round the country. He almost voted her a selfish woman. He thought, perhaps, she had an indulgent husband. In the interval of ten years, her sister came for a convergent strabismus with corneal opacities and keratitis, which he, in that ten years, had learned to associate with syphilis. In the meantime, her brother came with a high degree of myopia. By that time he was anxious for his first patient to come, and curiously enough she did come. On careful examination, there was one solitary lesion in the periphery of the fundus. He did not take her into his confidence. She had had so much experience with doctors that she had but little faith, and he was afraid she would not submit to treatment. He made her promise to hold on for three months. In five weeks she was a different woman, and he saw her at the theatre an entirely different woman. Another case was that of a professional man, a dentist with a very large practice, a comparatively young man. He was fitted with glasses for right hypophoria and esophoria. He came back again twelve months later. The vision was much worse; Argyll Robertson pupil, commencing atrophy. There was no history at first, but finally went back about sixteen years, and gave a history of having had a hard chancre. He always now thought of syphilis in muscular imbalance. He had been able to see two children quite recently whom he saw two years ago. They have had hereditary syphilis, but if placed before any audience now, some little distance away, they would strike one as being perfectly healthy. These things impress one so much when working in a town, and he found himself fighting hard to get syphilis recognised as a cause, as it must be, of general symptoms. A woman, age 35, was sent as a refraction case with headache and double optic neuritis, but no other intracranial symptoms. There was no error of refraction. The case had been treated for pelvic inflammatory trouble for some months. He suggested treating her for syphilis for two months. At the end of that time the optic neuritis was much better, but what interested even more was that the pelvic trouble had disappeared. With regard to the teeth, he would like to say that teeth very broadly spaced and very wedge-shaped were very suggestive.

Dr. Box said as to trephining in cases of optic neuritis, he might quote a case at the Williamstown Hospital about seven years ago; that of a child living with the grandparents. Both parents, from the history given, were rather loose characters. This child, aged $11\frac{1}{2}$ years, had become suddenly unconscious during an attack of what looked like some slight febrile ailment. It was thought that the child had influenza. The grandmother went one morning to feed the child, and found that she could not see the plate on the bed in front of her. The condition of the eyes was one of intense optic neuritis. He advised the parents to allow the child to be trephined. This was done within eighteen hours of the time he had first seen her, and within 36 hours of the time in which the child had given the history of not having been able to see the plate in front of her she could count fingers at 20 feet. She was, of course, kept under mercury for some considerable time afterwards. It was about four years now since he last saw her. The vision then was $\frac{5}{8}$ partly in both eyes.

Dr. KIRKLAND (Sydney) said Dr. Gibson, in his paper, had shown us a very large number of uninterrupted successes, and he was glad to hear Dr. E. Ryan mention some difficulties that arise in connexion with diseases of the eyes. At the present time, he had under his care the case of a girl.

who was beyond suspicion, so far as exposure to venereal disease was concerned. The case was one of iritis and vitreous opacities, unfortunately complicated with tubercular disease, and in spite of the most heroic treatment, continued for some time, no improvement had taken place. He would have liked to have heard Dr. Gibson express some opinion as to the comparative value of different methods of treatment. It seems to be accepted that treatment by the mouth and by inunction is sufficient for all cases. In the few cases he had seen treated sub-conjunctivally, more improvement had been gained than by treatment by the mouth. At the present time, he had a case of laryngeal disease, in which there is extensive swelling, involving the cords and subglottic space. The swelling is red and smooth, and is accompanied by an excessive amount of expectoration, which has been found to contain staphylococci and streptococci, but no tubercle bacilli. The patient denied ever having had syphilis, but gave a history of having had a sore on the tongue, which ultimately yielded to some form of treatment. He had been under observation for about nine months, during which time he had taken mercury, combined with iodide, up to 30 grains, three times a day, but no improvement had taken place. Syphilitic lesions of the larynx respond more slowly than lesions elsewhere. One or two ocular cases treated sub-conjunctivally have generally complained of such pain that he had been obliged to give it up. Sir Victor Horsley has said that any one not trephining in double optic neuritis is guilty of criminal negligence.

Dr. BRADY (Sydney) said in regard to syphilis affecting the other parts than the eye that he had come across sometimes cases of hereditary syphilis of the labyrinth in young people. When one looks at these people, one very often sees that they have had interstitial keratitis early, and finds perhaps that several years earlier they may have shown this sign, and perhaps not been treated. When one comes to treat them, one finds that some of them have gone completely deaf, and no treatment does them any good. If this disease were treated earlier in the eye, probably the ear would be saved, so that the eye surgeon has an opportunity of recognising the disease in an earlier stage, and probably curing it, and when it comes to the ear surgeon, it is probably too late. He did not know what the experience of others had been, but his own has been very disappointing.

Dr. J. P. RYAN (Melbourne).—With regard to syphilitic iritis, notwithstanding the fact that everybody acknowledges that the use of mercury is perhaps essential, still it is more essential that local treatment should be carried on from the beginning—atropin, leeches, &c. What he meant was that strong atropin solutions should be at once used—that the pupil should be dilated. With regard to the apparent failure in many cases of treatment by mercury, undoubtedly it is due to the fact that in many cases the mercurial treatment is not applied in time. Many cases of specific choroido-retinitis, beginning with specific iritis, we see perhaps twelve months, or two, or even three, years after the disease has attacked the patient, and are then atrophic. It is quite out of the question to expect that any but the smallest amount of good can be obtained by any kind of treatment.

Dr. KENT HUGHES (Melbourne) thought it would be of interest and of value if some one would tell us how early and how late one might expect to find acute and chronic inherited syphilis. At the Children's Hospital he had not seen very much syphilis of the special organs, although one sees an enormous amount of syphilis in other parts of the body. From the ages of some patients who have been suspected, one would almost think

no age too late to have an acute manifestation. He thought, as far as teeth in syphilitic children go, that Dr. J. P. Ryan ought to be somewhat careful in making any definite statement about the teeth, because any wasting disease may alter the primary teeth. With almost any disease, the crowns of the teeth waste very quickly. As far as syphilis in adults goes, one point that may be of value is that it is not so often recognised as it might be. Specific disease in the nose is more often present than is suspected. If one looked carefully for it, one might find the manifestations of syphilis which had been overlooked in many cases. As regards treatment, syphilographers state now that a case is not treated by mercury, unless it is by intramuscular injections. For children he used m.v. of grey oil, equal to $\frac{1}{2}$ grain of mercury twice weekly. The Americans are the strongest school in this respect, although many of us have had good results from these injections. Care must of course be taken that the injections are intramuscular and not merely superficial. As regards the part that syphilis plays, it is hard for us to make any definite statement to submit to Congress. We should really think out some points that appeal to us as a special department to send up to Congress.

Dr. POCKLEY (Sydney).—Syphilis is polymorphous, and there is no part of the eye it does not affect. His own opinion was that syphilis in eye disease is not such a very serious matter as in other parts of the body; the remote and permanent effects are not so great. Although Sydney has the reputation of being the place in the world where there is more syphilis than anywhere else, he had not come across very much syphilitic eye disease, either in hospitals or in private practice, and the syphilitic eye disease has this advantage, that it is nearly always curable. One can always have a wide scepticism as regards what patients tell us about syphilis. We were taught many years ago, by Dimmer, that choroiditis is always syphilitic, except in cases of high myopia, and at the menopause in women. When you have a case of very high unequal myopia in growing children, you often find that the case is due to syphilitic antinatal changes. In regard to the treatment by mercury, his own practice has always been to give it by the mouth, and, in acute cases at any rate, by the mouth is as quick as the intramuscular. Minute frequent doses of mercury salivate early.

Dr. GAULT (Melbourne).—Some four years ago went through his private and hospital case-books, and found that 5 per cent. of the patients seen had had manifestations of syphilitic disease of the eye. That perhaps does not seem a very high percentage, but when one remembers the large number of repetition cases that come to us it probably means that syphilis is a very serious disease. The other thing that had struck him is the fact that one so frequently finds evidence of syphilis in the eye; that is if we accept the dogma that interstitial keratitis is evidence of syphilis, without evidence of it elsewhere. That is of interest from many points of view. It is a question whether we should not reconsider these dogmas to some extent, and endeavour to establish them firmly by elaborate examination of histories in cases where we find syphilis by examination of the eye. Further, it relates to the question how far we should urge immediate and continuous treatment; whether it is a fact that the disease having attacked the eye and expended its force there, we have any reason to fear further ravages in the body generally.

Dr. ODILLO MAHER (Sydney) said he usually gave mercury by the mouth. He must say that he had found obstinate cases do wonderfully well with sub-conjunctival injections. It is a most painful procedure, but there

is no pain at the time if cocaine is injected first. With regard to the teeth in syphilis, one finds that the teeth have decayed conditions, and he had also seen cases of undoubted syphilitic keratitis in children with secondary teeth, where there has been no manifestation at all of syphilis. There is no doubt that syphilitic affections of the eye, if you get them early, are very amenable to treatment.

Dr. EWING (Melbourne).—Speaking from experience in ear, nose, and throat work, one is not brought so frequently into contact with syphilis as in eye work. When you do come in contact with it, the results are most disastrous. One of the most pitiful cases he had seen was that of a man who was suffering from blindness, due to interstitial keratitis and optic neuritis, complete deafness, and locomotor ataxia. Occasionally we had to be prepared for syphilis in any guise. Some four months ago, he was called in consultation to see a young lady, highly respectable, living in a mansion, whom the general medical attendant had been treating for ulcer on the tonsils for some three weeks. There were some very hard matted glands on the same side of the neck, and from the sloughing appearance of the tonsil, there was no doubt that it was a case of primary chancre. He gave his opinion, and then the question came up, should one tell the father? He was satisfied that one should, and did so. How were we going to test the diagnosis?—Are we to wait until the appearance of secondary symptoms before commencing treatment? If so, we may be losing valuable time. If we commence treatment, secondary symptoms may not appear. Fortunately, another method is available. He had not had an opportunity himself to apply the serum test of syphilis, but a sample of blood was taken and sent to Dr. Hiller. He gave his report “undoubtedly syphilis.” This means of diagnosis should prove of great value to oculists, when in doubt, as they must often be, as to the diagnosis of eye diseases. In regard to the mercurial treatment of syphilis, some years ago, when at Moorfields Hospital as clinical assistant, a number of cases of paresis of the external rectus were being treated with iodide of potassium. He made the suggestion of adding mercury to the treatment, which was done, and all the cases recovered, and it became a general practice for mercury to be given with potassium iodide. Another point is, how long should mercurial treatment be persevered with? He followed Fournier, who was most insistent that mercurial treatment should be carried out for not less than four years. He thought it was incumbent on them to bring their knowledge as a special section in no uncertain manner before the general body of practitioners, as we have probably more knowledge than the general practitioner of the damage done to the individual many years after the onset of syphilis.

Dr. KENNY (Melbourne) said, if we went through our case-books, the percentage of syphilitic eye cases would often be higher than 5 per cent. There is a statement made in the President's address with regard to the iritis that was not syphilitic being generally rheumatic. While at Moorfields quite recently, he found that one had to deal with gonorrhœal iritis in most of those cases that had previously been called rheumatic. He had seen cases of choroiditis, which he was convinced were not syphilitic, and which did improve under antispecific treatment. Of course, in making such a statement, it is open to say that the margin of error of diagnosis is very wide in this direction. The case of syphilis of the larynx, mentioned by Dr. Kirkland, brings to mind a case brought before the staff of St. Vincent's Hospital some time ago of a man who

had been on iodide for rather a considerable period. The staff asked how much iodide, and the late Dr. McInerney pressed me to push on with very large doses of iodide. He had had a case of syphilis of the larynx recently in hand. The patient was now up to one drachm of potassium iodide three times a day; he did not get anything like improvement until we had reached 30 grains for a dose. He said that the depression was such that life was hardly worth living, and his stomach was continually rebelling against it. With a little persuasion he gradually got up to the one drachm three times a day, and a larynx he was in doubt about as to malignancy cleared up remarkably. It is therefore worth while pushing on with the iodide to large doses. Regarding mercury, he was very fond of inunction. Dr. Brady had referred to some cases of syphilis of the labyrinth which are very unsatisfactory in treatment. In those cases the use of pilo-carpine hypodermically seems to favorably modify the conditions in some way, the rationale of which he did not understand. There has been some experience in the Melbourne Hospital lately with a tumour of the abdominal region. It was suspected that the case was syphilitic, and mercurial treatment was pushed, without results. The tumour was exposed, and the wound was closed up. Mercury was kept on, and the tumour began to disappear. What the actual explanation may be, he did not know. There is a great deal in the suggestion that some of these cases are tubercular, and in his experience some are double infections, syphilis and tubercle together. It is hard to know how to combine treatment for the two things in a successful way. A young woman was brought to me at St. Vincent's Hospital recently with an unmistakable chancre on the frenum of the lower lip. She had a very large deep ulcer, with perfectly hard edges, and later on ulcers on both tonsils. Within about four months of the primary lesion, she got rupioid scars on the left hip. In that case, although mercury has been pushed, she does not do quite so well, and lactic acid locally gives better results than anything else applied to the tonsil ulcers. She takes a grain of calomel with a quarter grain of opium three times a day.

Dr. J. W. BARRETT (Melbourne).—As one's experience in practice has increased, there has grown the conviction of the increasing prevalence of syphilis, and of the large amount of damage which is traceable to it. Many years ago, he realized for the first time that in the congenital form, it may exist in the most serious form without a trace of clinical evidence. So interesting was the case, that he ventured to relate it. He removed the eye of a child for glioma, and found the orbit filled with growth. On recurrence of the disease, the child was shown at a meeting of the Medical Society. She was an apparently healthy child, with a protrusion from the orbit. Dr. Cherry, the pathologist, who had examined the eye, reported that the arteries appeared to be syphilitic, and in this he was confirmed by Dr. Mollison. The child showed, however, absolutely no clinical evidence of syphilis. A little later, it died suddenly in convulsions. The only condition that would account for death was the presence of a small gliomatous tumor, rather smaller than a pea, just inside the optic foramen. In order to test the conclusions arrived at by Dr. Cherry and Dr. Mollison, a *post-mortem* examination was made. Glissons capsule was thickened, the piamater was thickened, and there was atheroma of the aorta. The reason that oculists in general are so impressed with the efficacy of mercury is that they are able to see syphilitic changes which are invisible in other

parts of the body. It is frequently possible to trace the syphilitic causation of iritis, of interstitial keratitis, or of choroiditis, and if in a number of cases the causation can be clearly traced, why should we assume that in other cases where, from social and other reasons, the chain of causation is not obvious, that some other toxin is responsible for similar appearances, particularly as the diseases are usually controlled by anti-specific treatment. The more seen of practice, the more convinced had he become of the wide-spread dissemination of the remote effects of syphilis. A number of tubercular people were probably syphilitic, and contract tubercle because they are syphilitic. For instance, we have, unfortunately, just had a death under chloroform anæsthesia at the Eye and Ear Hospital. A *post-mortem* examination was made, and the patient was found to have suffered from syphilis and an enlarged thymus. It is the lowered resistance of the syphilitic cases which explains the fact that they succumb to scarlet fever, to injuries and accidents which would not kill healthy people. With reference to the various diseases which had been referred to during discussion, he had never been able to satisfy himself that episcleritis or sclerotising keratitis are syphilitic, but of the bulk of cases of choroiditis and iritis he had not the least doubt. Dr. E. Ryan has referred to the cases which do not do well, and has suggested that they may not be syphilitic. That explanation is possible, but is there any warrant for the assumption that all cases of syphilis will give way to treatment. We know as a matter of experience that tabes and other parasymphilitic affections are not favorably influenced by anti-syphilitic treatment, and it is quite conceivable that pathological changes occur, and lesions are produced, which are quite beyond medicinal treatment.

Reference has been made to the practice of trephining for double optic neuritis, and to Horsley's dictum on the subject.

Symphilitic optic neuritis is of two kinds. In the one, toxins affect the nerve ends, and the disease simply consists of a double optic neuritis; in the other a syphilitic new growth is formed in the skull, the pressure arises, and double optic neuritis is produced in the same manner as it would be produced in glioma, or other intracranial tumor. With the exception of the direct syphilitic cases, and those which can be directly traced to toxemia, he now trephined in all cases of double optic neuritis, usually in the parietal region, and with division of the dura. The treatment of syphilis seems to be misunderstood. Drug treatment alone will not suffice in many cases. They are frequently associated with general debility, and with anæmia, and unless that element is dealt with, the drug treatment at times fails. He preferred to put every severe syphilitic case into hospital, treat them by the Weir-Mitchell method, give large doses of iodide by the rectum, and moderate doses of mercury by the mouth. If people will submit to this treatment, very satisfactory results can be obtained.

Dr. GIBSON, in reply.—It seems to me that we are very much in accord with this matter of syphilis, both in regard to its frequency and in regard to the importance of prolonged treatment. Those of us who find it difficult to get patients to continue for two years would find it still more difficult to get them to continue for four years, but it would often be very important to do so. My contention is that if you get a case early, there is nothing so amenable to treatment. Leave it until it is too late to treat, and you get very little result. He could not help thinking that some of the cases that do not respond to treatment are cases where tubercular mischief has been implanted upon syphilitic mischief, and it is a well-

known fact that there is no constitutional condition upon which tubercle implants itself so readily as upon a syphilitic constitution. He thought almost all medical men are agreed upon that point. Of course, anti-syphilitic treatment is only treating part of the condition, and then the less serious part of it. It is very important if Congress is to publish any resolution about syphilis, it should very firmly emphasize the opinion that early treatment is very important. Fail to treat early, and trouble is certain, although it may wait until the patient is sixty or seventy years of age. Dr. Kenny stated that some choroiditis cases improved under treatment, and still he did not think they were syphilitic. He was extremely glad to hear what Dr. Barrett said, and he put it even more strongly and better than the opener—the fact that he had come to realize the importance of considering conditions that were syphilitic without any other manifestation being present.

The question is whether we should ever excise an eye for tumor without first giving the patient the chance of anti-syphilitic treatment. With regard to trephining cases of optic neuritis, where there is no constitutional taint, he was entirely in accord with it. The question really arises, if there is a constitutional taint, is it not worth while to try and get rid of the condition without subjecting the patient to an operation which weakens the skull for the rest of his life?

Dr. WEBSTER (Melbourne) moved :—

“ That this section offers the suggestion that a circular be prepared for circulation amongst the chemists of the Commonwealth, calling their attention to the ravages of syphilis, and the danger to the community, and urging them to refer all cases of venereal disease that apply to them for treatment to some medical man of repute, or to some hospital.”

Seconded by Dr. Pockley (Sydney).

Carried.

NOTES ON SOME OF THE SPECIAL CLINICS OF THE WORLD.

A. L. KENNY, M.B., Ch.B.

Honorary Surgeon to St. Vincent's Hospital, Melbourne, for Diseases of the Eye, Ear, Nose, and Throat.

Owing to the time occupied with the papers and discussion on syphilis, Mr. Kenny was unable to read his paper, but showed lantern slides of photographs of clinics taken by and for him during his recent tour, and made necessary explanations concerning them. The seventy-four views shown included the following:—

Various appliances and lamps used in the Finsen Light Institute of Copenhagen for the treatment of the interior of the nose and larynx.

The St. Petersburg Municipal Eye Hospital, of which Dr. Blessig is the director—the male operating room, the male examination room, with its sideroscope, large electro-magnets, and English model of perimeters, and one of the six out-patient consulting rooms.

The Municipal Ophthalmic Hospital d'Alexieff, of Moscow, under the directorship of Professor Adelheim, founded by the Alexieff family, with the examination room, the children's ward, and the operating room.

The Basanova University Klinik for Diseases of the Eye, Ear, Throat and Nose, in Moscow, controlled by Professor Von Stein. This is the most complete institution of its kind in the world, and was built, furnished, equipped, and endowed by a philanthropic noble lady of Moscow, Madame Basanova. Professor Von Stein was given *carte blanche* with ground, building and equipment, including the purchase of the whole of the unique acoustic instruments manufactured by König, of Paris, under Helmholtz. There were shown views of the centrifuges used by Von Stein in the investigation of the function and the symptomatology of the semi-circular canals in man, a portrait of Madame Julie Basanova, a ward for six patients, the auditorium (being the hall of consultation and of practical work for students), the operating room, the König instruments (which cost many hundreds of thousands of francs), special transillumination lamps used in this hospital, a modified new model of a washstand for patients, details of the special surgical fittings of the auditorium, views of the facade of the Klinik.

La Fondation Ophtalmologique Rothschild, of Paris, under the direction of Dr. Trousseau, was illustrated by views of the principal entrance, the aseptic pavilion, the operating room, the septic pavilion, the special provision for infants with ophthalmia neonatorum, and for their mothers, who are taken in to nurse them.

The American Presbyterian Mission Hospital at Teheran, in Persia, was presented, with views of the wards during a recent cholera epidemic, a surgical ward, a Saturday morning class, with Dr. Wishart operating upon a case of cataract in the presence of the students, the new operating room.

The Copenhagen Communal Hospital, with its beautifully built and equipped ear clinic, under the charge of Professor Holger Mygind, the large out-patient examination room, the major and minor operating rooms.

Of the Eppendorffer Hospital, at Hamburg, with its 2000 beds, views were given, from the magnificently fitted bath-house to the operation rooms, the ground plan of the eye pavilion, the interior of the women and children's pavilion, &c.

The methods of cleansing the walls in the Infectious Diseases Hospital at the Institute Pasteur, at Paris, required two views.

The ophthalmic and surgical clinics of the University of Tokio were shown in two slides.

Jullundur General Hospital, in the Punjaub, India, under the charge of Major Henry Smith, I.M.S., who does more than 3000 cataract extractions per annum, was thrown on the screen in two views.

Mt. Sinai Hospital, in New York City, and the German Hospital in Philadelphia, with the Episcopal Eye and Ear Hospital in

Washington, the Manhattan Eye and Ear Infirmary, the new marble Harvard Medical School, were demonstrated by means of several photographs.

Several views of the Royal Victoria Hospital, at Belfast, Ireland, especially demonstrated the perfect success of the Plenum system of artificial ventilation.

The Donders Memorial Eye Hospital, at Utrecht, with a view of the late Professor Snellen operating, &c.

The private hospital of the Archduke Carl Theodor, at Munich, who probably does more cataract extractions than any other oculist in Europe.

SOME EXPERIENCES OF OPHTHALMIC CAMP HOSPITALS IN EGYPT.

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In reading this paper, I want you to understand that I do not intend to describe or discuss deeply any of the ophthalmic diseases which are so prevalent in Egypt. Your secretary, in proposing that I should read a paper on my work in Egypt, thought that a short description of the Ophthalmic Camps, and the way the work was carried on, might be of interest to members, and also prove somewhat of a relaxation among the many learned papers set down for discussion.

I propose, briefly, to give the history of the origin of these camps—construction of the camp—and to describe our daily routine work. Passing on, to speak more in detail of the class of cases applying for treatment, and of the operative treatment employed. Finally I shall have a few words to say on that disease which seems to be indigenous to Egyptian soil, namely “Egyptian Ophthalmia,” so-called, or what is a much better name, Trachoma, for as we, in Australia, unfortunately know, it is not only in Egypt that this disease is prevalent.

It was in 1903 that the Right Honorable Sir Ernest Cassel, G.C.M.G., who was largely interested in Egypt in a financial way, struck, as everybody is, by the enormous amount of eye diseases in the country, presented to the Khedive some £40,000, to be used for the relief of eye diseases among the “fellaheen,” or poorer classes. The Right Honorable the Earl of Cromer, O.M., G.C.B., G.C.M.G., British Consul-General in Egypt, was nominated sole trustee. (This has now devolved on Sir Eldon Gorst.) A committee of the leading ophthalmic surgeons in Cairo, with Sir Horace Pinching, the then Director-General of the Public Health Department, was formed to decide the best means of carrying out the founder’s wishes.

It was decided to establish a Travelling Ophthalmic Hospital, on the lines of the travelling camps then used in Russia for the treatment of trachoma, in the outlying provinces, camping a few months in one place, and then moving on further.

With this end in view, Mr. A. F. Macallan, F.R.C.S., was appointed to take charge of the first camp.

Dr. Macallan arrived in Cairo in July, 1903, and at once set about organizing his camp. He was singularly fitted for this work, being, as he was, not only an extremely able ophthalmic surgeon, but also an excellent organizer and administrator. And it is due to his untiring energy and able direction that the camps are doing such good work to-day.

While waiting for the equipment to arrive, Dr. Macallan visited several of the chief towns in the delta, and the people were notified that he would see eye cases at the Government Hospitals "free of charge." Policemen were used as advertising medium. (Government hospitals make patients pay in most cases.)

In this way, the aim of the scheme became known, and when Dr. Macallan set up his camp at Menouf, the centre of a very populous province, he did not want for work.

The success of the scheme was assured from the outset, the fellaheen (men and women) attending in numbers far exceeding those who could be efficiently treated.

So it was decided to equip a second camp, and I was fortunate enough to be appointed to take charge of it. I arrived in Cairo at the end of August, 1904, and spent the next three weeks in "sightseeing" and attending the clinic of Dr. E. C. Fischer, ophthalmic surgeon to the Kasr-el-aini Hospital, to whom I was indebted for much valuable information. I was able to see the manner in which the work was carried out, and received many tips, the value of which I recognised later on.

After leaving Cairo, I joined Dr. Macallan at Damietta, where he had his summer camp. I may say we found tents far too hot in summer, and both summers we used an old barrack room at Damietta for the hospital. Osman Digna was a prisoner there, and took great interest in the hospital.

At first we found considerable difficulty in getting the patients to do what one wanted; but one soon got to know enough Arabic to rub along with.

I started my first camp at Galioub, a town 15 miles north of Cairo, on the main railway line. (never went far from railway, owing to carriage, also patients), on land lent to us by Chawabi Pasha, who was the principal land owner in the district. I may say he was so much struck by the way the people appreciated the hospital, that after we left he built and endowed a permanent hospital himself. When I left Egypt he had just equipped and handed it over to the Public Health Department to administer.

Our camp consisted of a large "Durbar" tent (12 by 12, lofty). This was our "operating theatre," and we had a cement floor put down, to avoid dust, and so that it could be washed. Two first-class inspectors' tents—kitchen (composite), servants' tent, Bash tamurgi tent, with stores, patients' tent (after another shelter tent for O.P.S.).

My staff consisted of native assistant, graduate of Cairo Medical School at Kasr-el-aini, spoke good English (taught in English, very good man, great worker. &c.): tamurgi (hospital attendant), trained Kasr-el-aini, who looked after instruments and operating tent. I called him Filmer. Bash tamurgi (head), responsible for camp stores, did the clerking and issued cards to patients.

Other servants were cook and three Kaffirs.

Clinical work began at 8.30 a.m., when the in-patients were seen, then operations would go on until 11 a.m., when previous operation cases were dressed; then new cases were seen and sorted out, and old cases treated. Work would go on until 1 p.m. (at first 2.30 p.m., saw 396, myself 8.30 to 2.30).

Then in the afternoon fundus cases were seen and refractions done, and any interesting cases were more fully gone into. Friday, no work.

In-patients, two tents (male and female), four beds in each. Woman from village (not skilled) to look after women. Beds—spring, clothes, and food, as Kasr-el-aini.

In-patients only cataracts, which we always kept in hospital fourteen days.

The numbers of new patients seeking treatment were so great that it was impossible to take more than one in ten. I have had as many as 260 new cases in one day. Average number was 70 to 100 daily, of which we took about ten in fifteen; as after the camp had been running some time, our old cases for treatment averaged 200 to 300 a day.

The new cases were placed in rows and we examined them in order, sorting them into groups. Treatment—Lid operations, and intra ocular operations. Cataracts and cases of interest were given cards at once. Groups were again sorted out, preference being given to children, young able-bodied men, young women, older men and women, and women with babies (we had to modify this later, as they either borrowed a baby or left it at home); and those who had only one eye. Cases which were pretty sure to benefit by treatment, rather than those in which it was problematical. Distance was taken into consideration; those who lived close given cards.

Those who were incurable were sent away at once.

Each new patient was given a "taskara" (ticket) for notes on case, and a leaden disc with a number on it corresponding to that on the ticket. The disc they kept (used as a charm), the card was kept at the hospital. (Used to swap or sell discs).

The condition of the patients was taken into account. Tried to teach them cleanliness. The dirty ones were sent away at once, even if they had come miles. They used to go to the nearest canal and come back shining from recent scrubbing; but it was no good, they were told to come tomorrow.

Setons cut off (they, very fond of them, used to come up with string through neck, running suppurating sores), and onion leaves, poultices, &c. Charms were cut off (cowries hung over affected eye), and they were given the choice of keeping the charms and getting no treatment, or cutting them off and being treated. All with kohl (antimony pigment—considerable grit sets up conjunctivitis—is much used by the women, and also for the babies) sent away to come up clean, and told not to put kohl on their eyes.

As regards the women, we had no difficulty. It was thought by some that they would attend the hospitals from Hareem customs. Far from it. At Galioub 58.6 per cent. were women, at Damietta 59 per cent. Many reasons—easier to get away from work in fields, &c.

The class of cases seen covered the whole range of ophthalmology. Of course, the great majority were trachoma and its sequelæ. In my statistics, which are not complete, for many reasons, loss of papers, &c., at

Galioub 90.3 per cent., at Damietta 91.6 per cent. of all cases attending showed trachoma in some form.

Then next in order came lid conditions—entropion, ectropion, blepharitis, &c., for the majority of which trachoma was responsible. Galioub 47.1 per cent., Damietta 3.2 per cent.

Then adherent leucomata, or opacities of cornea, due to ulcers. Again, most may be set down to trachoma. Galioub 39.9 per cent., Damietta 38.5 per cent.

Then it was impossible not to be struck with the number (enormous) of lost eyes, either phthisical or staphylomatous bulbs. Galioub 8.4 per cent., Damietta 11.8 per cent. (which only includes those whom we took in for operation or treatment, and takes no account of the numbers sent away as incurable. Of these, those with eyes lost from birth up to three years were—Galioub 62.2 per cent., Damietta 61.3 per cent.

Here one may remark on the extreme rarity of sympathetic ophthalmia. Dr. Fischer, to whom I spoke of this, told me he had very rarely seen it at the hospital, and then in Europeans. I only had one case that showed the classical signs, in a boy of seventeen to eighteen years, with a shrunken globe, due to an injury by a twig of a tree some four years previously, with a calcified choroid. The eye was rhomboidal in shape. Tried to get him to submit to excision, but could not.

But I was struck by the fact that many one-eyed patients suffered from a superficial haziness of cornea of the good eye when examined with a lens. I was first struck by it when examining the uncle of the assistant doctor, who wore a shell on his shrunken globe (common in Egypt), and I examined many cases afterwards, and nearly always found a similar condition. What the connexion is, if any, I do not know; but I fancied it might be of a sympathetic nature, acting on the fine ciliary nerve branches in the cornea.

Another extremely common trouble in Egypt was glaucoma. Galioub 4.4 per cent., Damietta 2.1 per cent. in my camps.

These percentages are only in those who were taken for treatment. In all cases seen, Macallan puts it at 17 per cent., and I am sure it is no exaggeration to say that quite 20 per cent. of the fellaheen applying for treatment were blind in one or both eyes.

Glaucoma simplex was very common in young women between twenty and thirty years—have seen it under twenty, with nothing to account for it, *i.e.*, injury or other disease of the eye; wide pupils and opaque lens. Usually too late for benefit.

Of course, secondary glaucoma is a very common sequela of adherent leucomata.

Cataract was fairly common. Galioub 5.5 per cent., Damietta 2 per cent.

The difficulty was to get them into the eight beds (which was all our funds would allow), and also to get the lids into good enough condition to operate. Many tired of treatment, or did not come often enough.

Another large class of patients seen was those who had been operated on for trichiasis by the village barber or travelling charlatans. Galioub 18 per cent., Damietta 10 per cent.

This operation, called the "reed operation," consists in tying off a large fold of the upper lid between thin pieces of reed, and allowing the skin to slough off, leaving a granulating surface which heals over and then contracts. The immediate result is good; but afterwards the upper lid is so shortened that lagophthalmos is produced, with xerosis and destruction

of the cornea and the trichiasis almost always recurs, even in those whose lids are not so much permanently shortened.

Also, they practise couching of the cataractous lenses, with the usual evil results.

Coming now to describe the routine operations we performed for trichiasis and entropion.

As to our antiseptics, we did the best under the circumstances. Cement floor of tent was washed daily. All our towels, swabs, and dressings were sterilized in a Schimmelbusch portable steam sterilizer, using primus stove. But the difficulties were many. It was hard to get good light in the tent without getting all the dust as well, and the flies were very troublesome. In the winter it was very cold, and I used to wear a thick sweater over my waistcoat. In summer it used to get very hot, even though the roof of the tent was lofty. I have often had to wear a hat, as the heat striking on the back of the neck as one bent over one's work used to make one feel quite sick.

Patients for lid operations first had their faces well scrubbed with carbolic soap and nail brush. Then, placed on the operating tables—we used two in order to save time—2 per cent. cocain was dropped into conjunctival sac, and 2 per cent. cocain in 1 in 1,000 adrenalin solution was injected beneath the skin. Usually 10 m. did for both lids. I found this very satisfactory, being practically painless. I have done children of twelve years without a movement. In fact, they used to ask for it—"Give me the chloroform you put in with a needle, Doctor Pasha." Of course, chloroform was given to the young children.

Then the lids and sac were well washed with 1 in 5000 perchloride of mercury solution.

Of all the operations for entropion of the upper lid, the modification of Snellen's and Anagnostaki's gave the best results (it is the one done by Fischer at Kasr-el-aini). But we used a metal spatula instead of Desmarres lid clamps. They were much better for getting at the edges of the lids. Still clamps give a bloodless field, and do away with the assistant; but one is not much troubled with hæmorrhage.

An incision is made through the skin 2-3 m.m. above and parallel to the free border of the upper lid. The skin is dissected up to the upper border of the tarsus, and the muscle dissected from the tarsus. Then a wedge-shaped piece of the tarsal plate is removed parallel to lid margin; or not, as the case may be—it depends on the amount of entropion. Better to do it, I think. A needle carrying silk-worm gut is passed through the skin upon back just above the lashes, then through the upper part of the tarsal plate, and finally through the upper skin flap. Five of these sutures are usually sufficient. After tying the sutures, an incision is made with a Beers knife along the free border of the lid just behind the lash area. About 1 m.m. deep; care being taken to keep the knife behind the hair bulbs.

A thin layer of gauze wrung out in 1 in 5000 HgCl_2 was laid over the eye, and a woollen pad and bandages applied. The patient was told not to move bandages, and to come up on the third day, when the stitches were removed and another pad with boric ointment applied for one more day. Then given 1 in 8000 HgCl_2 lotion to use at home.

The results were excellent. I saw several twelve months after being done, and there was no recurrence of trichiasis. The splitting of the free edges allows the lash area to be everted slightly, and though a bit unsightly after the operation, very soon the split edge regains its normal

look. Dr. Fischer does not include upper skin flap in his sutures; but to do so makes a much neater job.

Macallan's modification of Snellen's is quicker, easier, and gives very good results; though not so good as above, in my opinion.

Proceeding the same as above until the sutures are inserted, the needle is passed from before back through lower skin flap, then horizontally through the upper part of tarsal plate, then from behind forwards, through lower flap. Three or four sufficient. Lash area is drawn up to the top of tarsal plate. Edge of lid split if necessary. Skin edges are smoothed into position and sutured if necessary.

Macallan cuts off all the lashes "except those that are displaced inwards" previous to operation, and he ties his sutures "above" the lash area. Personally, I always left the lashes, and in tying my sutures included the lashes in the lower loop, so that when finished the lashes were flattened against the upper lid. The oozing from the skin edges soon stiffened the lashes, which formed a sort of splint, and, to my mind, assisted healing by keeping the skin edges in position. Whereas, in Macallan's method the upper skin flap was inclined to curl under and to overhang the lower. And I did not find the lashes induced sepsis at all.

In those cases where the upper lid was much shortened, as after a "reed" operation, Van Milligen's graft from the lower lip was used.

The upper lid was split for some 5 m.m. just behind the lash area, and the ant. flap stitched to the eyebrow with three or four sutures. Then the graft, devoid of all fat, was pressed into position, dressed with ungt. ac boric pad and bandaged. We did not find it necessary to suture graft into position, as is often suggested.

It was left until the third day, stitches removed, and dressed for another day or so. I never knew a graft not to take, and nearly all did well.

These were the routine operations performed; but we devised and practised many modifications to meet special cases, as where only a few lashes were involved, and would have been removed by electrolysis, where time was no object.

One could not help being struck with the very small amount of sepsis, as the people were very dirty, and the conjunctival sacs being diseased, the wound would be bathed in viscid discharge on the third day. Still, an occasional stitch abscess was all that happened.

Iridectomy for adherent leucomata were helped off the table, made to sit still for half an hour before going home, seen daily for as long as necessary. (One out of 402 operations.)

Cataracts.—Cases were all in-patients, and while their lids were being treated, my assistant used to train them to keep still and do as they were told. So good were they, that I never gave chloroform in upwards of eighty senile cataracts, and one would go back and find them in the same place in bed twenty-four hours afterwards. I remember one man brought a large bag, which he got into on the operating table, and tied round his neck, so that the fleas, which were very prevalent, would not cause him to move. These cases were kept in the hospital fourteen days, and given glasses when discharged.

Cataract was fairly common in young children. Lamellar cataract was uncommon. I only saw one. Mother gave the history of the child seeing quite well until three or four years old, then "going blind." What the

cause was I do not know; but as almost without exception they were all profoundly anæmic from anchylostoma worm, I put it down to malnutrition of the lens.

In most cases the lens was quite fluid, and on the capsule being punctured the milky contents gushed out and mingled with the aqueous; and on curette evacuation being done, a perfectly black pupil was obtained. Others had a denser nucleus, while in one or two cases calcareous particles were found in the pupillary centre, just beneath the ant. lens capsule.

As regards the cases for treatment, it practically resolved itself into the treatment of trachoma. Egypt may be looked upon as one of the homes of trachoma—practically all the fellaheen have trachoma in some form, 90 per cent. and 91 per cent. of all cases. How any escape seems rather a puzzle.

I don't intend to go into the question of the causation of trachoma, but simply to quote to you some of the reasons of its widespread nature which come under one's notice.

Trachoma, we all know, is contagious. From their earliest infancy babies are subjected to risk of infection. When born, they are never completely washed for a week, and, if known to be of syphilitic parents, never thoroughly washed for a year (said to bring out the rash). Almost immediately after birth, the child's face and eyes are smeared with khol pigment, which in itself produces a conjunctivitis, and so fertilizes the soil for trachoma infection by reducing the resisting power of the conjunctiva; also the khol pot is common to the family.

Then among the poor fingers are used for most things, and it is very common to see a mother wiping the corners of the baby's eyes with her fingers, which may have just been used for the same purpose on herself. Fingers used in many ways.

Then the conditions of the country—bright sun 364 days a year, and no shelter for eyes from the headgear they wear, dust (which is always present), crowded nature of their dwellings (mud huts). The flies, which are one of the plagues which have remained, and are very trying in the summer time: child with fly ulcer of the cornea; babies whose eyes are a seething black mass of flies. Cataract child with goggles. (I may here mention that something that struck me as purulent ophthalmia was almost, but not entirely, confined to the summer time, when flies were at their worst, and attacked mostly small children who were too young to keep the flies away from their own eyes.)

Then many of the so-called cures for ophthalmia tend to spread the trouble.

The cure for a sty was to walk round a tomb from right to left, and dip wool into a trough that dogs drink out of, wiping the eyes with the wool. Religiously unclean—stop at home.

As to the treatment, we did nothing new. Routine was to express granules and rub in 2 per cent. Hg. Cl_2 aqueous solution, or cyanide, then continue daily with 2 per cent. Hg. Cl_2 (aqueous sol.), Cu SO_4 AgNO_3 2 per cent., Argyrol and Protargol were used. Of all, Hg. Cl_2 seemed to give the best results; but the difficulty was to get them to come regularly. However, in those that did the results were very gratifying.

The trachoma in Egypt was much worse than any I saw elsewhere. In Moorfields, I saw much, Russians, Poles, &c. I have seen undoubted trachoma, with large granulations, in a child nine months old.

When I say we tried nothing new, I am not quite correct, I did try pure carbolic by mistake. My assistant was away. Tamurgi could not read Arabic, gave me pure carbolic instead of Hg. Cl₂ sol. The result was not so bad; but I had not the pluck to continue.

Another thing that struck me was, one-eyed people were much worse on the side of the good eye than on that of the shrunken globe. Reason, I don't know. Friction?

In conclusion, though the good hospitals do at present can only compare with the "drop in the bucket of water," still, to my mind, their great value at present is educational. The natives are finding that it is much better to seek treatment early than to sit at home and work various charms as they used to do. And when the present intention is carried out, to have permanent ophthalmic hospitals in each province—one is already built—much benefit must accrue, not only to the inhabitants themselves, but also to the natives at large, as the number of blind and useless inhabitants will, I hope, be materially lessened.

Lord Cromer, in his book "Modern Egypt," says:—"Not very long ago, Mrs. Ross, daughter of Lady Duff Gordon, visited Egypt. Forty years previously she had had peculiar facilities for observing the condition of the people. I asked her what was the change that struck her most. I was pleased and also surprised at her reply. She said: The marked decrease of ophthalmia."

THE DIAGNOSIS OF TRACHOMA.

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The diagnosis of trachoma cannot with certainty be made in every case which comes before us, until such time as the specific micro-organism which is its cause shall have been definitely isolated. In order, therefore, to determine the nature of any case suspected of being trachoma, we have to depend to a great extent on the history and clinical features of the disease. In a majority of instances, these will suffice in guiding us to a correct diagnosis, but every now and then we are likely to meet with cases which for a while may puzzle us, and which time and frequent and close observation alone will clear up. It depends a good deal on the stage of the disease, and the more or less prominence of any characteristic symptoms which may present themselves in the patient on the occasion of our first seeing him. "Granulations" may be few and small, and partly buried in thickened mucous membrane, which may not as yet have assumed the roughened appearance produced by the development of the so-called papillæ, and there may be little or no pannus. Under such circumstances, it is clearly impossible to decide, on the moment, whether we have to deal with trachoma, or with some less virulent inflammation of the conjunctiva, and we are therefore not warranted in expressing any more than

a carefully guarded opinion. In the earlier and middle periods of the course of trachoma, the signs which are most prominent are "sago-grain" granulations, enlarged papilla and pannus, while towards its termination linear scarring of the lining membrane and general thickening and hardening of the upper lid are the most noticeable. Granulations, although probably present in every case of trachoma, are not always visible. Wherever there is much inflammatory thickening of the conjunctiva, they are soon covered up, not to be again seen until this condition has subsided. Or should the disease have become chronic by the time resolution has occurred, they may have atrophied, or have been absorbed. It may be stated roughly that granulations are demonstrable in inverse ratio to the development of the pseudo papillæ. But to insure a correct diagnosis, it is necessary to have a clear conception of what we mean by trachoma. The word, as you know, is derived from the Greek *trachus*, rough, for roughness of the lining membrane of the eyelids was one of the prominent characteristics noticed by the earliest observers. The roughness, often so perceptible to the touch, is not produced directly by the granulations, which seldom project much above the surface of the thickened conjunctiva, but by the hypertrophied and projecting so-called papillæ. It was long afterwards that "granulations" (the name given them by Bendz) were noticed and described, and that sequelæ of the disease received the attention which they merited. Trachoma, or granular conjunctivitis, or granular lids, is a more or less chronic inflammation of the lining membrane of the eyelids, due to infection, and characterized by puckering of the thickened membrane into the so-called papillæ, and by the presence in it of "sago-grain" granulations, of pannus and ulceration of cornea in the severer cases, and of certain sequelæ, which may result in more or less damage to eyesight. Under certain conditions, perhaps, of engrafted infection by other micro-organisms, trachoma assumes an acute form, when there is much inflammation, photophobia, blepharospasm, and mucopurulent discharge, sometimes overlooked on account of the profuse lachrymation which continuously washes it away. In many of the ordinary cases which come under treatment early, the granulations are not numerous, and are scattered over the tarsal mucous membrane, and lodged in the fornices, while the lower lid is comparatively free from them. Under such conditions, the patient makes a complete recovery without damage to lids or cornea. On the other hand, when the disease is severe and prolonged, or improperly treated, extensive pannus is followed by dense and permanent corneal opacities; cicatrization of the lining membranes of the lids leads to deformity of the tarsal cartilages, inturning of the borders of the lids, and in only too many instances to partial or total loss of vision of one or both eyes. The disease is almost certainly due to a micro-organism which as yet remains to be discovered, though many distinguished workers in the field, such as Hirschberg, Raehlmann, Sattler, Von Michel, and others have at different times found various bacilli which, for a while, they supposed to be its "vera causa." The latest investigations into its pathology are recorded in an article by Professor Frosch and Dr. Clausen in the July number of the *Archives of Ophthalmology*. They found in the discharge, as well as in the "follicles," or granulations, minute diplococci, which they believed to be the specific micro-organisms of trachoma. But so many mistakes have already been made by searchers after the bacillus that we must hesitate to accept their conclusions as final until they are confirmed by other investigations. The papillæ are only puckerings or foldings of the thickened conjunctiva and

Henles glands, the furrows between them. But granulations, or "follicles" (so called by Bendz because of their resemblance to the solitary "follicles" of the intestine), the most important signs of granular conjunctivitis, what are they? Nothing more or less than rounded or flattened aggregations of lymphoid cells in the adenoid lair of the conjunctiva. Much discussion has arisen as to whether or not lymph follicles are found normally in the human conjunctiva. They undoubtedly exist in that of some of the lower animals, but it is now generally agreed that when they occur in man, they are pathological. They are, according to Herbert Parsons, collections of lymphoid tissue, found under certain conditions in the lining membrane of the eyelids. They consist of (1) a stroma, the reticular tissue of the adenoid layer of the conjunctiva; (2) lymphoid elements; (3) vessels; and (4) an inconstant fibrous tissue capsule. Much controversy is still being carried on about the nature of these elements, which need not here be discussed. It will suffice for my purpose to recognise them as collections of different kinds of lymphoid cells, occurring in, and being the special characteristic of trachoma. Whether or no they are met with in other diseased conditions of the conjunctiva is a question which has not been definitely settled, though some of the highest authorities hold that they also occur in follicular conjunctivitis as well as in other non-inflammatory conditions of the lids.

In the principal text-books, trachoma is divided into two forms:—
1. Papillary; and 2. Follicular or granular; and most of the authorities, including Fuchs, of Vienna, are agreed that a mixed or combined form is that most commonly seen. The papillary form is characterized by hypertrophy of the conjunctiva, particularly of that of the upper lid, and by the development of excrescences, the so-called papillæ, but no mention in this form is made of granulations. The second kind is recognised by the presence in the lining membrane, mainly of the upper lids and fornices, of "grey" translucent, roundish "granules," which have been likened to eggs of frogs' spawn, or grains of boiled sago. Such a division of trachoma is, to say the least of it, unfortunate. If it be correct, it implies, if it does not directly affirm, the existence of two separate and distinct diseases, one only of which bears the hall-mark of granulations. Such a contention cannot easily be maintained. Clinical experience teaches that no matter which form may at the time predominate, the course of events, as well as the termination of the disease, depends almost entirely, not on the form, but on the duration and severity of the attack. The essential factor in both is the trachoma "granulation." It is always present, though on account of conjunctival hypertrophy, it is not always visible in the papillary form, but if carefully looked for, it may be in the earlier stage before thickening of the lining membrane of the lid has buried it, or later, when thinning has taken place, it can in considerable numbers of cases be demonstrated.

With it are associated the salient features of the disease, the characteristics which give it such signal importance, and which lead in so many instances to such serious consequences, viz., extensive pannus and contraction and deformity of the lids. Roughness similar to that of the papillary form of trachoma is found also in spring catarrh, in chronic blennorrhœa, and in other non-inflammatory affections of the conjunctiva, but in none of these is it followed by serious results. We are naturally driven to the conclusion that roughness *per se* is not very harmful, that some other factor is wanting, and that most probably the missing link is the trachoma "granulation." Bearing then in mind a definite conception of

trachoma, I shall now proceed to compare it with, and differentiate it from, other affections of the conjunctiva, to which it bears some resemblance.

1. Chronic blennorrhœa was often confounded with trachoma when both were included in the term "Egyptian ophthalmia," but the only true resemblance between them is papillary hypertrophy and general thickening of conjunctiva, sometimes found in both. Blennorrhœa runs a shorter course, does not give rise to pannus, and is not followed by cicatrization and deformity of the lids. Should the gonococcus be discovered in the discharge, which is by no means certain in chronic cases, it will help to clear up the diagnosis, and, in addition, the history of the onset and course of the disease should enable us to distinguish between them.

2. Vernal, or spring catarrh, sometimes bears a striking resemblance to trachoma. Both are chronic diseases; in both the conjunctiva, particularly that of the upper lid, is much thickened, and the papillæ greatly enlarged. But the course of the two affections is strikingly different. Spring catarrh is markedly worse during the warm months, while the exacerbations of trachoma are quite irregular. Again, the flat testulated-pavement appearance of the enlarged papillæ in spring catarrh, the peculiar milky sheen of the affected surface, the elevations of the sclero-corneal margin extending a little over the limbus, but totally different from pannus, and the absence of granulations should enable us to distinguish this affection from trachoma.

3. Severe and long-continued mucus-purulent conjunctivitis, due to the Koch-Weeks bacillus, and where the papillæ are enlarged and the conjunctiva thickened, may for a while be mistaken for trachoma. But its greater amenability to treatment, its shorter course, and the absence of pannus and granulations will serve to differentiate it from trachoma.

4. Tubercular deposits in the eyelid I can hardly imagine being mistaken for trachoma, but such mistakes, it is said, have been made. The resemblance is not striking, and the isolation of the bacillus of tubercle should settle the diagnosis.

5. Chronic conjunctivitis affecting the upper retro-tarsal folds, and in aggravated cases extending to the tarsal covering, might more readily be confounded with granular lids. This I believe to be a special kind of inflammation, though not distinguished as such in our text-books. It is essentially chronic; its locale is the fornix of the upper lid, and it generally attacks both eyes. It is often for a time devoid of symptoms, so that a patient may be unaware of its existence. In a certain percentage of cases, there are signs of irritation, such as a feeling of grittiness, slight photophobia, and some lachrymation, and rarely some mucopurulent discharge. It may be so little obtrusive as to escape observation unless the upper retro-tarsal fold be well everted. If that is done, the diseased condition becomes sufficiently patent. It will then be seen that the transitional fold is thickened, and its vessels greatly enlarged; but as might be expected from its loose attachment, it generally retains its soft feeling to the touch. Under ordinary conditions the surface is smooth, and pale-blue in colour, the blood vessels giving out a purple tinge; but when irritated and inflamed by the lodgment of dust or other infected material, the colour changes to bright-red, which extends, together with some thickening, to the tarsal covering, or even to the bulbar conjunctiva. It is at this stage that it might be, and has been, mistaken for trachoma. Hypertrophy of the palpebral conjunctiva is always less than in trachoma.

There is no pannus, and no granulations, and the acute attack rapidly disappears under treatment. The mucous lining of the palpebral part of the lid soon becomes normal, while that of the fornix, though losing much of its bright hue, retains a good part of its thickening. Generally, both eyes are affected at the same time, or nearly so, and occasionally trachoma is engrafted on the milder affection. But though enduring a long time, it finally disappears without leaving behind any traces of its former existence beyond some pallor of the fornices, a termination which is far from common in trachoma.

6. Follicular conjunctivitis, I have left to the last, because about it has arisen such keen controversy, first as to its pathology, and then as to its relationship to trachoma. It will be seen from my having classed it with affections which may be confounded with the latter, that I look upon it as a separate and distinct disease, though I must confess to my faith in the matter being not over strong. We are told by a host of authorities of the best repute that enlarged follicles, identical with those of trachoma, are constantly found in anæmic school children, and in the inmates of orphanages, reformatories, &c. I have had abundant opportunities of putting this statement to the test, and I have to say that I doubt its accuracy. I have never seen in such children any bodies exactly resembling the "sago-grain" granulations of trachoma, except in undoubted cases of that disease. According to Schweinitz, follicular conjunctivitis is characterized by the presence of small pinkish prominences in the conjunctiva, for the most part in the retro-tarsal fold, and usually arranged in parallel rows, and that it prevails in school children, orphanages, &c., and that pathologically there is no decisive difference between its follicles and those of trachoma. Fuchs holds similar views, but describes the follicles as pale in colour. They both agree that the follicles may exist without inflammatory symptoms, and that, unlike those of trachoma, they entirely disappear without leaving any traces behind. Saemisch said much the same about them years ago; while Rhein, Raehlmann, Sattler, and others maintain that there is no difference between them either clinically or pathologically. Authorities are much divided, also, in regard to their size and to the site which they occupy. In the midst of such confusion, and while so wide a diversity of opinion exists among the highest authorities as to the relationship between follicular conjunctivitis and trachoma, it may seem presumptuous on my part to express a view which is not in accord with theirs. I recognise a conjunctivitis, generally sub-acute or chronic, occurring for the most part in children living under unhealthy conditions, and characterized by the appearance in the lining membrane of the lower lid and fornix of pale-pinkish rounded elevations often arranged in horizontal rows. The disease differs in many respects from the granular conjunctivitis. It is milder, it does not as a rule occur in adults, the follicles are sometimes larger than those of trachoma, and are reddish instead of grey or white in colour, and are almost, if not entirely, confined to the lower lid, while the granulations of trachoma are mostly found in the upper. The course and termination of the two affections are very different. Pannus and cicatrization, which are so common in trachoma, and which not infrequently lead to such disastrous results, are not met with in follicular conjunctivitis, from which a complete recovery may always be expected. There is so little resemblance between the two affections, except chronicity and the presence of follicles or granulations, that one is puzzled to account for the various views which are maintained regarding the relationship which exists between them. Some

of the authorities look upon the two diseases as identical; others consider the milder one to be a precursor or early stage of trachoma; while a majority, including Fuchs, Seveinitz, Herbert Parsons, and others, maintain that while pathologically the follicle and granulation are identical, the diseases are distinct. If morphologically the follicle and granulation are the same, how can we account for their difference in locale, and for the very distinct role which each plays? The follicle of follicular conjunctivitis is apparently more or less harmless, while the granulation of trachoma gives rise to, or at all events is associated with, a serious and often dangerous inflammation. So wide a difference in results surely presupposes a difference in vital action, if not in structure. It is difficult to understand why the same follicle, if it is the same, in the lower lid in folliculitis, should be more or less harmless, while in the upper in trachoma it gives rise to a disastrous inflammation. A possible explanation, and one which I deem to be probable, is that the micro-organism, whatever it may be, which is the *vera causa* of trachoma, has its chosen site in the trachoma granulation. However this may be, and whatever view may be held as to the association between them, although I have never observed in children true granulations without trachoma, or without their producing at some period of their existence symptoms of trachoma, I have seen pink follicles in the lower lids of children in a quiescent state, as well as accompanied by inflammation, &c.

To sum up, I hold that trachoma is a specific contagious disease, produced by a micro-organism, not as yet isolated; that it occurs in adults as well as in children, affecting mostly the upper lids; that it is characterized by the presence in the conjunctiva of "sago-grain" granulations not found in any other affection, and which are the constant evident marks of the disease, and that whether they are visible in the granular form or covered up by thickened conjunctiva in the papillary, they are essentially and always the sign manual of the disease.

DISCUSSION ON TRACHOMA.

Dr. PABST (New Zealand) said—I find that trachoma is not nearly so prevalent in New Zealand as in Victoria. I may say that in ten years I have seen six cases only of trachoma. Three of those were people who had been in Australia before; the others were cases of Maoris. Last year, I saw two members of the Mormon persuasion, young men who had come out from America, and were trying to persuade the Maoris to become Mormonized, and who had trachoma. The Maoris have a trachomatous condition; but, as I have said, I have had practically no experience of trachoma for ten years.

Dr. BARRETT (Melbourne).—I should like to say that Dr. Orr, Dr. Lynch, and I have been collecting statistics relating to trachoma in Victoria, with the view of publishing them. Trachoma practically does not come from Gippsland, and but to a slight extent from the Western District; but comes principally from the north, north-east, and north-west. If there is a specific organism of trachoma, I do not know. I am perfectly clear that it occurs in direct association with dust and heat; that is.

so far as Australia is concerned. There are some of us who have seen in elderly men cases of ectropion. I would like to ask if any one has seen it in association with trachoma. I have never seen it, but I have had two marked cases in which it occurred in association with dust and heat. One patient got it in the Khartoum expedition, the other in Western Australia.

Dr. POCKLEY (Sydney) said—One fact that must strike all of us is that frequently we find trachoma in one eye, and the other eye is free from the disease. It cannot, therefore, be so contagious. I have often found cases of trachoma that have never been treated at all, and have done better than those cases treated with caustics.

Dr. GIBSON (Brisbane) said—What Dr. Pockley said with regard to the lids often being better in those cases that recovered without treatment than those that have been treated, it has often occurred to me that the reason for this is that resort is made to over radical treatment.

Dr. J. P. RYAN (Melbourne), in reply, said—With regard to heat and dust, there is no doubt that they are indirectly the cause of trachoma. It exists much more largely in a dusty country than in a moist country. I do not know, however, that the rule is universal. Many years ago, I lived on the Chile plateau, and though my knowledge of eye disease at the time was not large, I knew enough to be able to diagnose tolerably well such a thing as trachoma. I had charge of two hospitals there where everything was treated, and I have no recollection whatever of any prevalence of trachoma in that country. It exists there certainly, but it is not a disease that is as common as it is in Australia. The plateau is about 2,000 feet high. With regard to contagion, of course it is understood that the contagion cannot be grave, as is shown by the fact that it often occurs in one eye and is not transferred to the other eye, and it frequently occurs in one child in a family, and the rest of the family are not affected by it. In Germany, one does not see a German affected with trachoma. The cases that present themselves there are either Poles or Russians. In the same way in the United Kingdom, the poor Irish people were more affected with the disease than the English people, and recently some medical men in Aberdeen collected some 800 odd cases, and in the whole of the cases there was not a single case of trachoma. With regard to treatment, I think that certainly some of the after damage to eyes and eyelids is due to over treatment. Many years ago in a charitable institution, where I had to look after three or four hundred children, I used bluestone, and I may say that I was not satisfied with the results of the treatment. I reversed the treatment to extremely mild applications, sometimes little more than weak atropine, boracic and cocain, boracic lotion, such things as did not tend to irritate, and I was satisfied that the results of the treatment were very much better than when I used more active treatment. It seems to me strange that the two diseases, follicular conjunctivitis and trachoma, should be so absolutely different. I cannot account for it in the least; but still it is stated over and over again by some of our most expert eye surgeons, and repeated in the text books.

DISCUSSION ON THE TREATMENT AND PROGNOSIS OF PRIMARY GLAUCOMA.

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Before entering upon the subject matter of this discussion, I trust you will bear with me, while I briefly refer to the secretion and excretion of the intraocular fluid, and to the pathological conditions which give rise to increased intraocular tension.

My reason for so doing is that I consider it necessary in this discussion to keep these matters clearly before us.

It is generally accepted that the fluid which fills the aqueous chambers and nourishes the lens and the vitreous body is secreted for the most part, if not entirely, by the ciliary body, and that the major portion of this fluid escapes at the filtration angle, filtrating through the ligamentum pectinatum into the canal of Schlemm.

A comparatively small quantity passes through the vitreous, finding its exit at the papilla, and, according to Nuel, some also passes from the aqueous chambers into the veins of the iris and ciliary body. Obstruction to the free escape of this nutritive fluid causes increased intraocular pressure, resulting in glaucoma.

Many theories have been advanced to explain the cause of the increase of tension, but none of them is altogether satisfactory. In 1876 Max Kneis and Adolph Weber, in examining eyes destroyed by glaucoma, found, in nearly every instance, that there was obstruction at the filtration angle, and that this obstruction was caused by the periphery of the iris being either adherent to, or in contact with, the cornea. It has also been discovered that increased serosity of the nutritive fluid resulting from an inflammatory condition of the ciliary body, may block the filtration angle, obstruct excretion, and cause increased intraocular tension; and that the filtration angle in these cases, instead of being more or less obliterated, is usually wider than normal.

During the past thirty years the discovery of Max Kneis and Adolph Weber has been confirmed by numerous observers, many of whom have endeavoured to find the cause of the altered relationship of the base of the iris and the periphery of the cornea.

Much light has been thrown on this subject by Priestley Smith, whose views are very generally accepted, and who has drawn attention to the following facts:—

1. The size of the lens increases throughout life.
2. The liability to primary glaucoma increases throughout life.
3. The liability to glaucoma is greatest in eyes of exceptionally small size.
4. A disproportion between the size of the lens and the size of the globe can be demonstrated in some eyes blinded by glaucoma.

Priestley Smith has also demonstrated that the lens continues to grow throughout the whole period of life, while the structures surrounding the lens attain their full dimensions early in adult life. Consequently the margin of the lens gets closer and closer to the ciliary body with increasing years.

The examination of eyes blinded by glaucoma shows that these eyes for the most part are usually small, the lenses proportionately large, and the spaces between the margins of the lenses and the ciliary bodies are much less than normal. Such a condition predisposes to glaucoma, and all that is required to induce an attack is congestion of the intraocular vessels, especially those of the ciliary processes. Congestion of the ciliary processes causes them to enlarge at the expense of the aqueous, and to press the base of the iris against the periphery of the cornea. The enlarged ciliary processes also often come in contact with the margin of the lens, thereby obstructing the passage of the intraocular fluid from the vitreous chamber. This gives rise to an increase of tension in the vitreous chamber, pressure forward of the lens and ciliary processes, and further compression of the base of the iris against the cornea. When the increased intraocular tension is marked the *venæ vorticosæ* are compressed in their passage through the sclerotic causing further congestion of the ciliary processes, increased serosity of the intraocular fluid, together with all the signs and symptoms one is so familiar with under the title of acute glaucoma. When, however, the increased tension is slight and intermittent, the general ocular circulation is but slightly interfered with, and the external appearances of the eye remain practically normal, the most notable pathological change being the altered condition of the optic disc.

The more acute the disease, the greater the congestion, and the more rapidly adhesions form at the filtration angle. Most cases of acute glaucoma seek relief early on account of the pain and the rapid loss of sight, so that one has an opportunity of operating before the base of the iris and the adjacent cornea become adherent. In cases of acute glaucoma, when patients refuse to be operated on, or are so situated that they cannot have an operation performed, adhesions at the filtration angle soon form. On the other hand, in chronic glaucoma, the closing of the filtration angle by adhesions of the base of the iris to the adjacent cornea takes place more slowly, or possibly, in some instances, not at all. It frequently happens that these cases do not come under observation until the disease has existed for a considerable time, and when probably in the majority of them the iris and cornea are more or less adherent at the filtration angle.

Mackenzie was the first to note the increased hardness of the eyeball in glaucoma, and for its relief practised scleral puncture.

In the year 1856 Von Graefe first performed iridectomy for the cure of this disease. This discovery has conferred incalculable benefit upon mankind, and has rendered the name of Von Graefe immortal. The rules he laid down regarding iridectomy for glaucoma are practically those which are followed at the present time. The incision should be peripheral, the iridectomy large, and the iris removed, if possible, right up to its ciliary attachment. He also noted that when these conditions were not fulfilled in cases of acute glaucoma the results were not, as a rule, satisfactory.

With regard to the treatment of acute and sub-acute glaucoma, there can be little, if any, difference of opinion. The efficacy of iridectomy, and the necessity of operating as early as possible are universally admitted. Iridectomy affords immediate relief by the escape of the aqueous reducing the tension. The hæmorrhage from the iris, and the removal of the pressure on the *venæ vorticosæ* relieve the congestion, the ciliary processes subside, releasing the pressure of the iris base against the cornea, and as the anterior chamber is reformed the filtration angle re-opens.

Cases of acute glaucoma, on account of the pain and rapid loss of vision, generally come under treatment before union of the base of the iris and periphery of the cornea has taken place, and the usual result of the operation is the permanent re-opening of the filtration angle, and the cure of the disease.

We recognise that the operation for acute glaucoma is one of the most difficult in ophthalmic surgery. The shallow anterior chamber, the engorged vascular condition of the eye, and the sudden reduction of the tension, may all contribute to the possibility of some mishap, such as injury or dislocation of the lens. The iridectomy is generally followed by copious hæmorrhage into the anterior chamber, and frequently by hæmorrhages into the retina. The hæmorrhage into the anterior chamber soon absorbs, and the retinal hæmorrhage is of little consequence, unless it takes place at the macula, or is profuse. A more serious form of hæmorrhage, however, is the subchoroidal. Fortunately it seldom occurs, but when it does the eye is lost. Generally speaking an iridectomy for acute glaucoma, provided it is performed early, permanently re-opens the filtration angle, and the vision is not much worse than it was before the outset of the acute attack. In some cases, however, the success of the operation is not permanent, increased tension again sets in, when it becomes necessary to perform a second iridectomy, or a sclerotomy. Again, in some rare instances, years after apparently successful operative treatment, the sight steadily fails, owing to a secondary atrophy of the optic nerve. The later the operation is performed the less successful the result. It is surprising what good results one may get even in apparently hopeless cases. I remember operating on an elderly gentleman whose only eye had, according to his own statement, been totally blind for ten days. The case had been mistaken for one of iritis and atropin freely used. When I saw him he apparently had no perception of light, and was suffering acute pain. A week after the operation he could distinguish the light of a candle. The sight gradually improved, and after six months he could read ordinary type. His field remained very narrow, being contracted to within a few degrees of fixation point.

As a rule blind painful glaucomatous eyes are best enucleated.

When it is impossible or inconvenient to operate on cases of acute or subacute glaucoma, many of them can be relieved, and some of them successfully treated for a time by the use of myotics, which act by contracting the pupil, thereby drawing the base of the iris away from the cornea, thus re-opening the filtration angle. When myotics fail to contract the pupil they are useless, and may even do harm by increasing the hyperæmia of the iris and ciliary body. Although they are useful auxiliaries in the treatment of glaucoma, they cannot cure the disease. They render the performance of an iridectomy somewhat easier by contracting the pupil, and should therefore, if possible, be used for a short time before operating.

The treatment of chronic glaucoma is not so satisfactory as that of the acute form. The disease is painless, the progress slow and insidious, and the failure of the vision gradual and peripheral, the central vision often remaining unaffected for a considerable time. So gradual is the failure of vision that it often passes unnoticed until the disease is well advanced. Frequently patients for a time do not pay much attention to the failing vision, regarding it simply as the natural accompaniment of advancing years. Hence it happens that cases of chronic glaucoma are usually seen for the first time so long after the onset of the disease, that

the cupping and atrophy of the disc are well marked, and probably in the majority of them firm adhesions have already formed at the filtration angle, precluding the possibility of re-establishing the communication between the anterior chamber and the canal of Schlemm.

Iridectomy, in order to cure the glaucomatous condition, must afford some permanent means of exit for the intraocular fluid, either by re-opening the filtration angle, or by forming some new channel for drainage. Carbone has advanced a theory that iridectomy in glaucoma opens a channel for the drainage of the aqueous into the cut ends of the iris, which, it is asserted, do not cicatrize, but continue to present a raw surface, by means of which the aqueous drains away. When iridectomy is performed in recent cases before adhesions have formed, permanent re-opening of the filtration angle may be hoped for, whereas, in long standing cases of chronic glaucoma, as there is no possibility of re-opening the filtration angle, iridectomy, when it cures the disease, must do so by establishing some vicarious means for the escape of the aqueous.

It has been noted by many observers that cystoid cicatrices are more liable to follow iridectomies performed on glaucomatous, than on non-glaucomatous eyes, the reason being that the scleral section heals slower, and the union is less firm. De Wecker was among the first to advocate that the section should be in the sclerotic, as the resulting cicatrix frequently allowed the aqueous to filtrate through it. In his opinion the formation of a filtrating scar was the one essential in the treatment of chronic glaucoma, and the removal of the iris was quite unnecessary. He therefore introduced and advocated sclerotomy as a substitute for iridectomy.

Sclerotomy has but few advocates nowadays, as iridectomy, with a scleral section, possesses all the advantages of sclerotomy, and at the same time it affords a possibility of re-establishing a communication between the anterior chamber and the canal of Schlemm. In many operations for chronic glaucoma one not only fails to re-open the angle, but the wound in the sclerotic heals so firmly, that no filtration can take place through the resulting scar. These are for the most part the cases in which iridectomy fails. The operation causes hyperæmia of the ciliary body, resulting in increased and more albuminous secretion, and as the filtration angle is closed, and the edges of the scleral wound firmly united, increased tension results. Then it becomes necessary to perform a second operation, either another iridectomy or a sclerotomy, as the eye soon goes blind unless the tension is permanently relieved. If any advantage is to be derived from iridectomy in chronic glaucoma which has existed for a considerable time, since it is practically impossible to re-open the filtration angle, our aim should, in my opinion, be to establish a filtrating cicatrix.

Bader was a strong advocate for a cystoid cicatrix, which he made by performing a free sclerotomy, getting a large subconjunctival prolapse of iris. Legrange endeavours to get a filtrating scar by first making the usual scleral section, and then, before performing the iridectomy, cutting with a fine pair of scissors a small piece out of the anterior lip of the wound. Holth, having been impressed by the satisfactory results obtained from a cystoid cicatrix, aims at establishing one by getting the iris to prolapse into the wound. He considers it unnecessary to remove any of the iris. This appears to me to be simply a modification of Bader's operation. In Volume XXIII. of the Transactions of the Ophthalmological Society is published a paper by Major Herbert on "Subconjunctival Fistula Formation in the Treatment of Chronic Primary

Glaucoma," which is worthy of most careful perusal. Berry, in a recent communication which appeared in the *Edinburgh Medical Journal*, advises that "cases in which iridectomy, followed up by myotics, fails, should be treated by the formation of a cystoid cicatrix." The difficulty, however, often is to establish a satisfactory cystoid cicatrix.

For the past thirteen years my aim has been to establish such a cicatrix in cases of chronic glaucoma of long standing. I operate in the following manner. Having made the usual scleral section with a broad keratome, I drag on the iris with one, or preferably two, iris forceps—one in each hand—detaching its base at the part corresponding to the scleral section. The loop of iris thus formed is left well prolapsed for a week, when it is snipped off with an iris scissors level with the sclerotic at each angle of the wound. Sometimes I vary the procedure by cutting the iris at the time of the operation at one angle of the wound, and then, by dragging on it with the iris forceps, tear it away from its attachment corresponding to the section, in the hope, if possible, of re-establishing the communication between the anterior chamber and the canal of Schlemm. Instead of now completing the iridectomy I leave prolapsed at the other angle of the wound a large portion of the tag of iris thus formed, and at the end of a week snip it off level with the sclerotic. By this means I generally obtain small flat cystoid cicatrices. The same result may often be obtained, but with less certainty, by performing an iridectomy in the usual way; but cutting the iris so that it is left slightly entangled at one, or both, angles of the section.

Leaving the iris prolapsed for a week before cutting it off causes but little irritation, and ten days after the operation the bandages can usually be dispensed with. In one case, however, plastic iritis set in a few days after the operation, and the eye, which was almost blind, became totally so. Fortunately in this case I had previously operated successfully on the other eye, and had established a satisfactory filtrating scar. I have performed this operation many times during the past thirteen years, and regret that I have not kept notes of the cases. Some of them I have seen or heard of, who years after the operation retained good vision, and I have not seen any of these cases, in which a cystoid cicatrix has been formed, go blind. It does not follow, however, that this has not happened, for one easily loses sight of one's patients; but the probability is that, if such did occur, I should have heard of it. One case I have had regularly under observation for about six years, in which I operated on both eyes, producing a cystoid cicatrix in one, but not in the other. The sight of the eye with the cystoid cicatrix has deteriorated very little, if at all, while the sight of the other gradually failed, and the eye has been blind for the past three years.

I admit that eyes with cystoid cicatrices run a risk of infection, and that the entanglement of iris no doubt increases the liability to sympathetic ophthalmia. However, these unfortunate sequelæ are in my experience extremely rare, and I consider the advantages gained by producing a filtrating scar in chronic glaucoma so great, that they quite outweigh these possible disadvantages. I think it advisable to make a large coloboma for two reasons. In the first place, by tearing the iris freely away from its attachment, one may possibly re-establish in some instances the communication between the anterior chamber and the canal of Schlemm; and, in the second place, by freely removing the sphincter the iris becomes more quiescent, and the eye less liable to become irritable, and probably less liable to produce sympathetic ophthalmia.

I would not advocate the formation of a cystoid cicatrix when the operation for chronic glaucoma can be performed early, before the adhesions have taken place at the filtration angle; but, when the disease is of old standing, and on account of the firm adhesions between the base of the iris and the adjacent cornea, it is no longer possible to re-open the communication between the canal of Schlemm and the anterior chambers, I certainly think our aim should be to establish a cystoid cicatrix. The difficulty is to know when these adhesions exist, and when they do not; but, generally speaking, the longer the disease has existed the less likelihood is there of re-opening the filtration angle.

There are certain cases of chronic glaucoma in which it is not wise to operate. If the patient be old and feeble; if the field be contracted all round close up to the fixation point, especially if the progress of the disease be slow, and the centre of vision good; and if there be retinal hæmorrhages, it is wiser not to operate, but to treat such cases with myotics.

The results obtained by iridectomy in chronic glaucoma are often not satisfactory. According to Von Graefe half the cases are permanently cured, about one-quarter relapse and require a second operation, while the remaining 25 per cent. go blind in spite of all treatment. Nettleship, Hirschberg, and other ophthalmic surgeons have published statistics which practically agree with those of Von Graefe. On the other hand, Schleich has reported his experience of 102 cases in which iridectomy was performed. Of these, 8 per cent. became blind immediately, or soon after the operation, 76 per cent. gradually lost their sight, while two years after the operation in only 16 per cent. was there no further loss of vision. He obtained much better results in a series of 49 cases treated by the regular and persistent use of myotics. Of the 49 cases treated in this way, at the end of two years the vision of 39 per cent. remained stationary, while 61 per cent. became worse. He is opposed to operating on chronic glaucoma, and advocates treatment by the regular and persistent use of myotics.

Other well-known ophthalmic surgeons hold similar views. It is difficult to understand how skilled operators obtain such widely different results.

I shall conclude by again briefly stating my views as to the treatment of chronic glaucoma. Except in the cases already referred to, one should operate, and the sooner the better, performing an iridectomy according to the rules laid down by Von Graefe, when the disease is in the very early stage; but when, as in the majority of cases which come under our notice, the disease is of long standing, and therefore it is no longer possible to re-open the filtration angle, our aim should be to establish a cystoid cicatrix.

DISCUSSION ON GLAUCOMA.

Dr. GIBSON (Brisbane) said —My experience in acute glaucoma has been very encouraging. It appears now that the cause of glaucoma is not the blocking of the angle of the anterior chamber, but the blocking of the intra-ocular circulation, and I fancy that that is really Dr. Maher's explanation. Whether this is the cause of chronic glaucoma is another

matter, but I think we must all agree that it is this blocking that is the cause of acute glaucoma. If that is the case, there is no need for a cystoid cicatrix when operating for acute glaucoma, because the periphery of the iris is removed from the eye, and the anterior chamber resumes its size after operation. If we have increased tension and a deep anterior chamber, then an iridectomy alone cannot do any good. We must have a fresh angle formed either by a sclerotomy or a cystoid cicatrix, as Dr. Maher suggests, and in those cases I am inclined to the operation Dr. Maher has described rather than the operation so much spoken of in the journals lately.

Dr. RYAN (Melbourne).—With regard to the factors which go to the production of glaucoma, one must not forget, and it counts for the fact of glaucoma occurring more in old people than in young ones—the rigidity of the sclera, which undoubtedly is greatly increased in old age. In speaking of the use of myotics, nobody can for a moment think of their in the least supplanting an operation in acute glaucoma, but there are cases where they are effective when combined with remedial measures.

Dr. PABST (New Zealand).—I would like to know whether Dr. Maher would recommend operation for chronic glaucoma in a myopic eye. I have in mind the case of a man aged sixty years, with the right eye—6, the left—8, but very much damaged fundus; it is practically a useless eye. The symptoms disappear and recur. The tension is +, the cornea steamy, the eyes react to eserine.

Dr. KENNY (Melbourne).—I am reminded of the question put to the late Professor Snellen recently at a gathering of oculists at a European Congress. “What would you do, professor, with a bad case of chronic glaucoma?” “I would send it to a colleague,” was the prompt reply. In Bombay, I found Lieutenant-Colonel Herbert experimenting for the best cystoid cicatrices. He was much pleased with the stretching of the keratome wound in the sclera, for the iridectomy, with a special pair of broad flat hooks. Mr. W. Lang, of the Royal London Ophthalmic Hospital, does an iridectomy for glaucoma the instant he finds any symptom of the disease. Some American and continental operators perform a sclerotomy in order to make a better iridectomy. The method of irido-dialysis introduced by Uhthoff’s assistant is yet on its trial, but is being extensively practised.

Dr. J. W. BARRETT (Melbourne) said—Whilst the collection of masses of clinical material is of immense service, it must have occurred to all of us that the very careful and detailed observation of a single case is sometimes of extraordinary service, and I have had such an experience recently in connection with glaucoma. In 1897, I operated on the left eye of a patient for rather advanced chronic glaucoma. The disease was arrested, but there was very little residual vision. The patient, who is highly intelligent, fully appreciated the certainty of the disease attacking the other eye sooner or later, and has visited me periodically since. She has frequently complained of dimness of vision, but there has never been any trace of disease until comparatively recently. The complaint of occasional smokiness of the atmosphere, of occasional coloured rings round the candle, became a little more definite. The eye was again carefully examined; the vision was $\frac{6}{4}$, the field normal, whether taken with a large object or by the Bjerrum method; the tension was normal, but for the first time in the history of the case, arterial pulsation could be produced by moderate pressure on the globe. An iridectomy was performed, and the iris was found to be tough, thickened, and generally showing evidence of advanced organic change. It is quite clear,

therefore, that the clumsy means we have at our disposal for detecting glaucoma may only indicate the presence of glaucoma long after glaucomatous change has set in. If people are attacked with glaucoma in one eye, and operation is successful, it seems to me very questionable whether an iridectomy should not be done on the sound eye there and then. I have never had an accident in the performance of an iridectomy, but, of course, such a disaster might happen at any time, and I should hesitate to do an iridectomy on the sound eye if the eye first affected had been lost. Looking back on one's experience of chronic glaucoma, of sub-acute glaucoma. I have not seen one case in which operation has been refused, and an attempt has been made to control the disease by myotics, in which the eye has not been lost. I have seen very few cases indeed saved in the advanced stages, and I have seen very few cases lost where iridectomy has been done in the early stage.

Dr. MAHER, in reply, said:—I have been asked about a man aged sixty years, with myopia, as to whether one would operate. If he has myopia, he will certainly go blind if not operated on. If he is in robust health, and the fundus is in a healthy condition, I think he ought to be operated on. But if the man is in a feeble state of health, I should say it would be better to continue the treatment, and not to operate.

PULSATING EXOPHTHALMOS OF RIGHT EYE CURED BY LIGATURE OF COMMON AND EXTERNAL CAROTID ARTERIES.

EDWARD RYAN, M.B.

Ophthalmic Surgeon to St. Vincent's Hospital, Melbourne.

This condition is sufficiently rare to be worth recording.

Mrs. B., aged 46 years. Whilst going about her usual duties five weeks before I saw her, she got severe sudden pains in the right side of her head, but not specially severe in her right eye. A few hours afterwards she began to vomit, and did not cease vomiting until next day. She had diarrhoea as well. During the same night she got a throbbing sensation in the right temple, and felt a puffing sensation with every heart beat; exercise increased its frequency and intensity. Twenty-four hours after the onset of pain the right eye was more prominent than the left, and the eyelid was swollen, and looked as if a fly had bitten it. The eye squinted outwards, and her vision was lowered, and there was dropping of the lid. All these signs were aggravated, and her symptoms were becoming more distressing. Four days afterwards she consulted a doctor, who treated her by keeping her in bed and applying foment. She then came to Melbourne, and placed herself under my care.

Condition on Examination.—The face was not expressive of suffering, but looked older than the stated age. The right upper lid was swollen and black, as though from extravasation of blood, œdematous, heavy, and completely covering the eye. The lower lid was swollen, but less so. The right side of the face was blurred. There was marked exophthalmos, divergence, right pupil larger than the left, both acting normally. The ocular conjunctiva was œdematous, and there was deep ciliary injection. The cornea was normal, as also the anterior chamber. The eye was

fixed, media and fundus normal, except that there was marked arterio-sclerosis and slight distension of retinal veins. Pulsation of the eyeball was synchronous with the pulse; a loud, puffing murmur was heard all over the cranium, conducted in no definite direction. She had no eye pain or headache. The swelling of upper lid was increasing rapidly. General health fairly good. She had been operated upon thirteen years ago by Dr. O'Sullivan for some internal affection. Had been very well ever since the operation. I suggested operation at once.

On 13th June, 1908, the right common carotid and external carotid arteries were tied by Mr. G. Campbell Rennie. Three days after the operation the proptosis had almost gone, but the eye was suffused. There was slight headache, she was mentally perfect, and the vision was improved, but there was still slight external strabismus and decided muscular movement. Her convalescence was quite uneventful. Her mental condition never varied. The suffusion of the eye diminished slowly, but there developed a manifest enlargement of the subcutaneous veins of the eyelid. The pupils became almost similar in size, the right being still the larger. The excursion of her muscular movements became normal, but her vision gradually became lowered in the right eye to $\frac{6}{36}$. This was found to be due to a well-marked venous retinal thrombosis, forming a very characteristic clinical picture, with dilated tortuous veins, and the smallest arteries buried here and there under retinal exudation, but no marked swelling of the disc. A few hæmorrhages were noted. This thrombosis I considered as a most hopeful event at the time. There was also a patch of dilated veins—subconjunctival—on the outer aspect of the eye.

When the last notes were taken, vision right = $\frac{6}{12}$. The eye had regained its original condition, and the only trace in the fundus of the the trouble through which the eye had passed was some dilatation of the retinal veins.

The chief points in the diagnosis were—

1. Suddenness of onset.
2. The existence of arterio-sclerosis.
3. Exophthalmos.
4. Pulsation synchronous with the heart's beat.
5. Buzzing and puffing noises heard all over the cranium.
6. Pressure on the carotid of the same side caused the pulsation and throbbing to cease.

There could be no doubt that this condition could not be due to anything other than a rupture of the internal carotid artery into the cavernous sinus. I do not think the condition has been reported before in Australia, apart from traumatism.

The treatment was obvious; the only point debated was whether to tie the common carotid alone. Very few cases have been reported where the eye has been examined so long after operation, and fewer still where vision has so completely returned.

A CASE OF PRIMARY SPINDLE CELLED SARCOMA OF THE IRIS.

LINDSAY S. MILLER, M.B. and B.S., Melb.,

Late House Surgeon Royal London Ophthalmic Hospital; Inspector Travelling Ophthalmic Hospitals, Egypt.

Nellie C., aged 15 years, came to consult me on the 5th August, 1907, with the following history:—"Two years ago a small red spot was noticed in the left eye, which has recently become larger." I afterwards found out that the "spot" had been present for six or eight years.

Patient was a well-grown, bright, healthy-looking girl.

There was no history of injury, and never had been any pain, redness, or discomfort of the eye. Advised by her lodge doctor to come to me.

On Examination.—In the lower and outer quadrant of the left anterior chamber was seen a pinkish-brown, or dull, flesh-coloured growth, the size of a small "petit-pois." The growth was smooth, and rounded with dilated blood vessels coursing over it, and was growing from somewhere near the angle of the A.C., as no iris could be seen between the growth and the corneo-scleral margin. The conjunctival vessels leading towards the growth were dilated.

The iris was bright; pupil was active to light and accommodation, and was circular; the cornea above the growth quite clear.

The tension was normal, and the vision $\frac{6}{6}$ with + 1. Sph. 6-5 and J1, at 40 cms. Nothing abnormal could be detected in the fundus. I examined later after instilling atropine sulph. 1 per cent. sol. The pupil dilates well (also mentioned in Dr. Wood's case) except beneath the growth, where it is apparently prevented in a mechanical way by the growth, as no synechia are present.

The lens was clear, and no growth could be seen in the fundus or ciliary body.

From the history and the look of the growth, I felt sure it must be a primary sarcoma of iris. The absence of all signs of (i.) inflammation; (ii.), the vascularity of the tumour; and (iii.) the long period of inactivity, followed by gradual enlargement, serving to differentiate from other conditions.

I explained to the people what I thought the tumour was, and advised removal of the globe. They were unwilling to sacrifice the eye, so I agreed to try and remove the growth by an iridectomy. If not successful, it would at least clinch the diagnosis by examining some of the tumour microscopically.

On the 27th August, 1907, under CHCl_3 , I attempted to remove the growth, *via* a keratome incision. As the aqueous drained away, the growth flattened out, showing that it was of very soft consistence. I found it impossible to grasp the growth with forceps, they simply went through it as they would through stiff jelly. I did a small iridectomy on either side of the growth, and tried to deliver it and the intervening iris through the incision, as recommended by Haab. But could only succeed in delivering a small portion of the growth, which I removed.

The eye quieted down after the operation, leaving the growth flush with the corneo-scleral margin, and the iris and growth adherent to the lens capsule. A few spots of iritic pigment were on the lens capsule.

Unfortunately, the pathologist to whom I sent the growth to be sectioned, lost it. So no advantage had been gained.

I saw the case on the 7th October, 1907, when the condition was the same—no pain, injection, or discomfort of the eye.

18th November, 1907.—The eye was perfectly quiet, but the tumour had begun to grow again, and was 2 mm. from corneo-scleral margin. Tension was normal.

I did not see the case again until 6th January, 1908. The eye was quiet, but the growth was larger—3 mm. from corneo-scleral margin, and bilobed in character. Tension was, I thought, full.

On the 17th January, 1908, Dr. Barrett, who was in Hobart at the time, very kindly saw the case, and agreed that it was a sarcoma of the iris.

Notwithstanding that the serious nature of the case had been pointed out to the parents, it was February 22nd before I next saw the case.

The growth had then increased to 4.5 mm. beyond the corneo-scleral margin, and there were a few spots of punctate keratitis. T was + L.V., without correction, 6-18.

3rd March, 1908.—Under CHCl₃. I excised the globe. I forwarded the globe to Dr. Barrett, who kindly had it examined. I append Dr. Bull's report.



SARCOMA OF IRIS: DR. MILLER'S CASE.

Eye received from Dr. J. W. Barrett on March 11th, 1908, in 2 per cent. formalin. It was transferred to a 10 per cent. solution of formalin for 24 hours, and then frozen and bisected vertically, as a lateral or horizontal section one usually employs would not have cut the growth. Viewed anteriorly the growth forms a small bilobed mass occupying a lateral position in the anterior chamber, and apparently replacing the iris. The falling away of the iris at this locality is suggestive of an antecedent iridectomy.

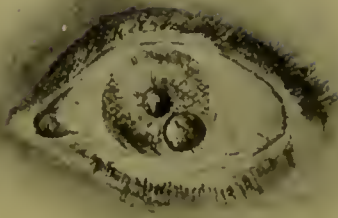
On bisection, the tumour forms a small diamond-shaped mass, greyish white in colour, with an antero-posterior diameter of nearly $\frac{1}{8}$ of an inch, resting on the lens, touching the cornea anteriorly, and replacing the iris.

The posterior border forms a line of pigment derived apparently from the iris.

The lens is slightly dislocated by the growth. The retina and other parts appear quite normal.

Microscopical examination proved the condition to be a spindle cell sarcoma, with a well defined edge, and without any appreciable infiltration of the surrounding tissues (cornea, scleral, and ciliary body).

A small amount of the remains of iris pigment is lying as free granules in parts of the section, and is not suggestive of a melanotic tendency,



SARCOMA OF IRIS,
MR. LINDSAY MILLER'S CASE.



although areas in melanotic sarcomata may be almost devoid of pigment, the latter is generally found within the tumour cells.

Thin walled vessels penetrate the growth.

* * * *

Dr. Bull also prepared and mounted the eye in glycerine jelly, which you will see with the sections.

The great rarity of primary sarcoma of the iris warranted one in reporting the case fully.

Casey Wood and Brown Pusey in their paper have gathered together some 80 cases. They class the condition as the "rarest of eye lesions."

As to the age at which these growths are found, 27 occurred before thirty years; 57 after.

Sex.—36 males; 45 females.

History.—In seventeen cases, the "spot" was noticed in the eye from seven up to as much as twenty years before causing symptoms.

In six cases only was a history of trauma noted.

Histology.—They are usually pigmented growths. Eleven are recorded as unpigmented.

Position of Growth.—In 35 cases primary seat was lower half of the iris; in 13, upper half; in 5, inner side; in 2, outer side.

Treatment.—Fuchs recommends removal by iridectomy.

Many other good authorities advise removal of globe at once.

Authors say: "When a diagnosis of sarcoma of iris is established, the eye should be at once enucleated."

For myself, I should never again try and remove by iridectomy, unless perhaps a very small growth.

Casey Wood and Brown Pusey collected cases. In 30 cases where iridectomy was tried, 10 enucleated shortly after. Of many of the other cases no further history is quoted.

* * * *

In conclusion, I beg to thank Dr. Barrett for his help, and also Dr Bull for the care with which he has prepared the specimens.

HOW TO PERFORM SNELLEN'S OPERATION FOR ENTROPION.

J. LOCKHART GIBSON, M.D., Edin., M.R.C.S.

For many years I have used Snellen's operation for entropion, and no other, except occasionally where the conjuncional surface of the lid requires a graft of lip mucous membrane. I have then adopted for several years now the operation devised by Dr. Odillo Maher.

Snellen's operation appears to be somewhat differently described in different text-books. The fact that operators are not more universally satisfied with it appears to me to be perhaps due to its performance in an incomplete manner.

I have employed it for old people and for young children ; for upper and for lower lids, and it has given me complete satisfaction both as an operation, and for its cosmetic results. Its results also have been permanent. I used to combine it with slitting of the lid margin, but discontinued that some ten or more years ago, and have never seen reason for resuming it. However careful we are to refrain from operating until some weeks after the lashes have been allowed to grow undisturbed, we are apt to leave an odd one or two on the conjunctival lip of the marginal incision ; also, when the lid margin is slit, we have no purchase when stitching on the lower fragment of the tarsal cartilage, such as we have when the lid margin is untouched. If we do not incise the lid margin, we can operate at any time, even a day or two after ingrowing lashes have been pulled out. We also evert the lower edge of the tarsal cartilage, which it is often important to do.

I incise the skin a short distance above the roots of the lashes along the whole length of the lid, and mark out by an incision above this, and uniting with its ends an oval piece of skin about 2 to 3 millemetres in breadth. With this piece of skin I remove the orbicularis fibres subjacent to it, so as to lay bare the tarsal cartilage in its lower and middle third. From the middle third of the cartilage a long wedge-shaped piece is dissected, penetrating to the conjunctiva, but preferably without button-holing it. This wedge must include the whole length of the tarsal cartilage. Whether it be removed from the lower part of the middle third, or from the upper part of the middle third of the cartilage, will depend on the amount of eversion required. I remove practically all the fibres of the orbicularis muscle between the groove in the cartilage and the lid margin, being careful to avoid injury to the root bulbs of the lashes. The stitching is best done with silk threaded with a needle at each end. One needle is passed through the lower lip of the skin wound close to the lashes, the other needle is passed through the upper lip of the groove in the cartilage, and then through the upper lip of the skin wound. Three to five stitches are used. When these are tied, the lower lip of the skin wound is pulled well upwards, and the lid margin is tilted forwards and upwards, the external edges of the groove in the cartilage being approximated. The immediate effect is always a little greater than we require as a permanency, and it is well that this should be so. The incision heals by first intention, and leaves no mark that is noticeable, but the scar is firmly fixed to the tarsal cartilage scar, and the eversion obtained is, therefore, permanent. The stitches are allowed to come out themselves, or are encouraged to do so by gentle traction after a week or two.

Sometimes the lower lids of young children, especially those whose lashes have always swept the cornea on account of congenital defect, possess such poorly developed tarsal cartilages that it is inexpedient to remove a wedge, and still further reduce their size. I have then found that a perfectly satisfactory result can be obtained by what is practically Hotz's operation, viz., rawing the lower edge of the cartilage, and stitching the lips of the skin wound to it.

My object in introducing the subject of entropion is that we may compare opinions on the operation to be selected. Since writing these notes, I have found that Snellen's operation is growing in favour in Egypt, and elsewhere.

I am delighted that Dr. Odillo Maher will have an opportunity of explaining his operation for entropion, as its value is insufficiently recognised.

Exhibited photographs of entropion cases subsequent to operation. In one case all four lids had been operated upon by Snellen's method, as described.

A NEW FORM OF TEST TYPE.

G. H. HOGG, M.D., and GERTRUDE HALLEY, M.B.

We have been struck, in the examination of a large number of school children, by certain defects in the Snellen's test types in ordinary use. These may be thus stated:—

1. It often happens that a child, although seeing a letter, or row of letters, imperfectly, is able to give the letter or letters their proper designation, that is, the test is not a purely visual one, but partly a mental deductive process.
2. There is a marked tendency for the children to guess the letters.
3. By the phonic method of teaching the children to read, many have difficulty in naming the letters, although they may see perfectly.
4. A number of children presented for examination are quite illiterate.
5. As it is almost impossible to have each child in a room alone while testing vision, the others may learn the test type by rote.
6. It is possible to arouse the interest of the younger children, and to stimulate vision effort by turning the test into a "game."

For these reasons we have introduced a new test type for the use of the Medical Branch of the Tasmanian Education Department, and claim that the type will give more reliable results in the examination of visual acuity.

This test type has been adapted from Landolt's optotype figure of a black ring on a white ground, each ring having a break with parallel edges. Landolt uses only one sign for each degree. In the new type several signs have been introduced for each degree, as this reduces the chance of guessing to a minimum, consequently the type presents a series of rings, the breaks being placed in varying positions in each ring.

Landolt represents the visual acuity in decimal form in 15 degrees, 0.1, 0.15, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1, 1.25, 1.5, 1.75, and 2.

We have preferred to use the Snellen's system of representation.

In the new test types, when placed at the marked distance, the spaces between the edges of the break correspond to an angle of one minute. Thus at a distance of 60 metres the break in the top figure corresponds to this angle, similarly in the second line at 36 metres, and so on.

The well-known fraction $V = \frac{d}{D}$, giving the measure of visual acuity—the degrees are $\frac{6}{40}$, $\frac{6}{36}$, $\frac{6}{32}$, $\frac{6}{28}$, $\frac{6}{24}$, $\frac{6}{20}$, $\frac{6}{18}$, $\frac{6}{16}$, $\frac{6}{14}$, $\frac{6}{12}$, $\frac{6}{10}$.

The purity of the whites and blacks of the card is essential, and it is hoped to have the types printed on porcelain at a later date.

SIGHT-TESTING CARD

(ADAPTED FROM LANDOLT'S OPTOTYPE.)

EDUCATION DEPARTMENT OF TASMANIA.



$D = \frac{5}{8}$



$D = \frac{5}{16}$



$D = \frac{5}{32}$



$D = \frac{2}{18}$



$D = \frac{5}{12}$



$D = \frac{5}{9}$



$D = \frac{5}{6}$

DISCUSSION ON DR. HALLEY'S PAPER.

Dr. BARRETT said—I think it is well to remember that none of these devices are scientifically accurate. So much depends on the relative blackness and whiteness on the illumination, and on the size of the pupil. There are so many factors that you cannot draw hard and fast conclusions. All you can say is that they are approximate clinical methods, which give some idea of what you are doing. These test types, however, will be a valuable device for those who are dealing with children.

Dr. KENNY.—I notice that Dr. Halley said she proposed to get the type done in porcelain. Whatever objections can be raised, as Dr. Barrett has shown, to the test types that were carefully done on paper, these objections are multiplied with porcelain. You sacrifice accuracy for permanency in these cases. I would earnestly suggest that the cards be not glazed or covered with gum or any preservative. I think it would be advisable to multiply the Landolt figures on the cards. I think Dr. Halley has been very wise in selecting this particular class of object as the test for the children in the schools. Another solution is to have them on board, not on a card. You can get the furniture men to make the boards for you out of wood that will not readily buckle, by having three layers of wood glued together, the grain being crossed.

A CASE OF DOUBLE GLIOMA.

D. H. E. LINES, M.B., B.S., Melb., Hobart.

Heather G., aged nine months, was first seen on 24th July, 1905, because her parents noticed one eye, the left, was "transparent."

On examination the pupillary area was pearly white in colour, and the eye was irritable. The pupil was dilated and the cornea steamy. Tension was + 1. Anterior chamber was shallow. The child was anæsthetized for thorough examination. On oblique illumination there are seen large bilateral detachments of the retina projecting from posterior fundus. These detachments were pearly white in colour, with large blood vessels coursing over them.

On direct examination two large nodular masses were seen in the left eye. These masses nearly meet, but there is a clear space between them. The right eye showed the same condition, but it was not so advanced. A diagnosis of double glioma of the retina was made and excision of both eyes advised. The parents were naturally very shocked at this, and at once said they would take the child to Melbourne for further advice. She was taken to Dr. Barrett, who also advised immediate excision of both eyes. He excised the left eye, but the parents refused to have the right eye removed whilst there was any vision left.

On the 1st October, 1905, the parents brought the child again to me, owing to her being so fretful and obviously suffering much pain in the remaining eye. The tension was + 2. There was marked ciliary injection, and the white pupil reflex was very noticeable. I excised the eye two days afterwards.

At the date of writing this—July, 1908—there is no sign of recurrence, and the child is in good health.

Two children have been born since this one. There is no sign of eye trouble with either of them. The father is a strong healthy man. The mother is hypermetropic and suffers from mitral regurgitation.

PATHOLOGY AND TREATMENT OF LACHRYMAL OBSTRUCTION.

ERNEST R. SAWREY, M.D., F.R.C.S.

Honorary Assistant Surgeon, Victorian Eye and Ear Hospital.

This condition is comparatively common, in hospital practice at any rate, and until the last few years its treatment has been so very unsatisfactory that no apology is needed for bringing the subject forward for discussion.

Pathology.—The immediate cause of lachrymal obstruction, excluding congenital or other affections of the puncta and canaliculi, is an inflammation of the lachrymal sac and nasal duct. This inflammation results in swelling of the epithelium lining the passages, as well as of the sub-epithelial tissues, accentuated by the engorgement of the dense venous plexus which surrounds the lachrymal sac and nasal duct. This venous plexus is analogous to those situated beneath the mucous membrane of the turbinate bones, and swelling of it alone suffices to contract or perhaps entirely close the lumen of the passage. In the natural state the walls of the duct are in apposition, and only separate when fluid is passing. The physiological mechanism for the passage of the tears from the conjunctival sac to the nose is now unequal to the task of forcing fluid through the swollen passage, which therefore collects in the sac, distends it, and causes increased irritation of its walls.

In this stagnant fluid germs carried by the tears from the conjunctival sac find a suitable medium for development, and very shortly the contents are swarming with bacteria of all kinds.

The walls undergo still further irritation and inflammation, an excess of mucus is secreted, and, mixing with the decomposing fluid, still further dilates the sac. As a matter of fact, the contents of the sac when evacuated with the finger seem to consist mainly of mucus.

If this condition continues for a long period attacks of subacute inflammation will occur from time to time, and eventually the contents of the sac become more and more turbid, and resemble pus. This mucopurulent fluid contains pus cocci in great numbers, and as a rule is extremely virulent, pneumococci being perhaps the most constant and most important of the many pathogenic organisms present.

Should an acute attack of inflammation occur in the dilated sac, purulent disintegration of the submucous tissues may result, leading to the formation of a lachrymal abscess, which ruptures externally. This may ultimately end in the formation of a lachrymal fistula. The inflammation of the lachrymal passages, which, as has been said, forms the first stage in the pathological process, has its origin as a rule in affections of the

nasal cavity. These comprise inflammations of the mucous membrane, acute and chronic catarrhal, tuberculous and syphilitic, the swelling extending by continuity to the nasal duct.

In atrophic rhinitis the cicatricial contraction of the nasal mucous membrane may be continued from the inferior orifice of the nasal duct upwards, and thus lead to a constriction. Ulcers again, such as are associated with tubercle and syphilis of the nasal mucous membrane, may on healing lead to cicatricial contraction, or obliteration of the duct.

Nasal polypi and other tumors may likewise obstruct the lower orifice of the nasal duct. Lachrymal obstruction being thus, in the great majority of cases, dependent upon some intranasal condition, the extreme importance of instituting a careful examination of the nasal passages in every such case needs no enforcement. Any pathological nasal condition found should receive prompt and appropriate treatment. It must, however, be admitted that in a very large number, perhaps the majority of cases, no sufficient cause within the nasal passages can be found. This may, perhaps, be partly explained by the fact that usually a considerable time elapses before the patient seeks advice for the eye trouble, and that then the causal nasal condition has disappeared.

Contrary to what might be expected, conjunctival inflammations rarely give rise to lachrymal obstruction.

Dacryocystitis, on the other hand, always causes some conjunctivitis, sometimes local in character.

Treatment.—It may, perhaps, not be out of place to insist upon the extreme importance of curing all cases of lachrymal obstruction as quickly as possible. No eye is safe in the presence of a mucocele. At any moment a corneal injury or abrasion may occur, and becoming infected by the virulent pneumococci almost invariably present in the mucus of the sac, hypopyon ulcer, with probable corneal perforation and loss of the eye, is the result. Many cases of panophthalmitis are undoubtedly caused in a similar way. Before performing any intraocular operation it is imperative that the tear passages should be examined for a mucocele, and, if present, that it should be cured, or at any rate treated in such a way as to prevent further infection of the conjunctival sac.

Neglect of this precaution has often led to disastrous results.

As has been previously mentioned, a lachrymal abscess may at any time develop from acute inflammation in a mucocele. A consideration of these facts shows the supreme importance of speedily curing all cases of lachrymal obstruction, the dangers attendant upon the condition being only too evident.

Two main methods of treatment are at our disposal, syringing, and excision of the lachrymal sac.

Syringing is remarkably successful when practised in the early stages of the disease, and when efficiently carried out will cure the majority of such cases. This happy result, however, can be attained on one condition only—that probes have not previously been used in the treatment of the case.

Should one or two syringings fail to force fluid through into the nose, many surgeons are in the habit of probing the nasal duct, either using a small probe without slitting up the canaliculus, or larger probes entailing a preliminary slitting of the canaliculus.

However skilful the surgeon, or however carefully the operation be performed, it would seem impossible to avoid serious injury to the inflamed and swollen tissues. Laceration must occur, as is evidenced by the

bleeding which usually follows. These lacerations must inevitably lead to the formation of fibrous tissue, the contraction of which invariably causes a more or less dense stricture of the canal.

Probing is again resorted to, and becomes increasingly more painful, for larger and larger probes must be used.

In short, the condition has become impossible of cure by syringing or any simple means, and probing at longer or shorter intervals must be practised for the remainder of the patient's life.

I would repeat that in syringing, efficiently performed, we have a means of curing the great majority of these cases, if seen tolerably early, and provided that probing has not been practised.

In order that syringing may be successful the patient must attend regularly and must understand the necessity of patience and perseverance while the cure is being effected.

The best instrument for the purpose is a Luer's all-glass syringe, fitted with a straight cannula. All the parts of this instrument can be readily sterilized.

The syringe is filled with boracic lotion, and after dilatation of the lower punctum, if necessary, the cannula is introduced into the lachrymal sac and the contents passed in. This process is repeated several times, and it is noted whether any fluid passes down into the nose. Probably this will not occur for several days, or it may even be two weeks or more before success is attained. The syringing ought to be repeated daily. Should the patient be very nervous, a few drops of a 2 per cent solution of cocain passed into the sac and squeezed out after a short interval will facilitate the manipulations which follow. In obstinate cases where the use of boracic lotion is insufficient to secure patency, a solution of protargol, about 15 per cent., can be passed into the sac, allowed to remain for a minute or two, and then the excess squeezed out.

It is advisable to cleanse the sac with boracic lotion previous to the use of protargol. No force must be used in the introduction of the cannula, otherwise a false passage may result, and the protargol solution be injected into the orbital tissues, with somewhat alarming results.

As a rule this treatment is rapidly successful in obtaining a passage into the nose, but the syringings must be kept up for a considerable length of time, gradually increasing the intervals. In the majority of cases thus treated a permanent cure is obtained; but unfortunately a certain number are not benefited permanently. There are several reasons for this. The patient, perhaps, cannot or will not attend regularly. The case when first seen may be of long standing, and permanent changes may have taken place in both sac and duct, or the sac may have completely lost its elasticity and be permanently dilated by its contents. Again, cases which have undergone probing are very generally incapable of improvement by this means.

In all the above cases excision of the lachrymal sac offers a radical cure. This operation may be performed either under general or local anæsthesia; but most surgeons prefer the former. For local anæsthesia adrenalin should be added to the cocain, and deep injections of the solution made around the sac.

Bleeding is always liable to be profuse and troublesome during the operation, for the angular vein, with many large tributaries, is in the immediate vicinity. As a rule it can be controlled by the application of adrenalin on small swabs and firm pressure applied for two or three minutes.

The incision should commence just above the internal palpebral ligament, which has been placed on the stretch, and be continued downwards and outwards to the inferior margin of the orbit. It should not be too short. The line of incision at the upper part should be outside the angular vein, and be internal to the inner canthus, about four or five millimetres. Profuse hæmorrhage will occur if the angular vein be opened, and at an early stage of the operation this is excessively troublesome. The internal palpebral ligament is completely divided, but no harm whatever results. By gradually dissecting through the fibres of the orbicularis the sac is exposed. At this stage it is well to feel for the crest of the lachrymal bone, which forms an accurate guide to the position of the sac, and by dissecting backwards and inwards in this direction with a blunt dissector, the inner wall of the sac is separated from the bone. Having now thoroughly defined the sac, Müller's special retractor, if not previously introduced, is now inserted, and the edges of the incision kept well apart. The speculum probably controls any hæmorrhage that may have been causing trouble. The fundus is now dissected out very carefully, partly by the blunt dissector and partly by scissors, and especial precaution must be taken to leave none of this part behind. The sac is now seized in a pair of forceps, and by pulling it well forward the outer and posterior wall is similarly freed, until finally it is only held by its attachment to the nasal duct. By combined pulling and torsion of the sac as much mucous membrane of the duct as possible is freed, and a sudden wrench brings it away whole.

It is as well to curette freely the upper end of the nasal duct.

The wound is now inspected carefully to detect any remains of the sac, and any piece found is dissected away.

No drainage is necessary, and a few silkworm-gut sutures are used to completely close the wound. A small round pad of gauze is applied over the wound, and over this an ordinary pressure pad and bandage. Healing is generally complete in a week, and the sutures may be removed. The scar rapidly becomes invisible, being hidden in the natural folds. It is advisable to inspect the wound the next day, as occasionally the small round pad may become displaced and injury to the globe result.

No pressure with the finger should be made over the wound for several days for any evidence of regurgitation, for in this way it may easily be torn open; and, as a matter of fact, this accident happened to me on one or two occasions.

When quite healed, no regurgitation should occur on pressure over the scar, if the operation has been successful.

If any part of the mucous membrane has been left, regurgitation on pressure will reveal its presence, and the operation must be repeated.

Both lachrymal sacs may be removed at the same operation if diseased.

The results of this operation, when the sac is completely excised, are excellent, and experience proves that epiphora, even if present for a little while after the operation, rapidly disappears and causes no trouble under all ordinary conditions. Only when the eye is irritated by cold winds, dust, and such like, does an increased secretion of tears occur and cause annoyance to the patient. The inferior lachrymal gland rarely requires excision to relieve the condition, and no case has come under my notice in which this was necessary.

By the exercise of a little patience, and by treating any conjunctivitis which remains as the result of the mucocele, a satisfactory result will, in the vast majority of cases, be attained without further radical procedures.

In children some cases of mucocoele are intractable, and resist all ordinary treatment. Excision of the sac must then be performed. It is a more difficult operation than in adults, owing to the less roomy field in which we have to work, and is generally rendered even more complicated by extensive disease of bone and surrounding parts, which has spread to the sac and has necessitated an operation for its removal. In quite young infants lachrymal obstruction is fairly often met with, and as a rule is soon cured. It is generally caused by an accumulation of cells in the lower end of the nasal duct at its entrance into the nose. Frequent squeezing out of the contents of the sac and a weak astringent lotion will generally suffice for a cure, working the fluid into the duct by an imitation of the natural physiological mechanism for the passage of the tears.

If a cure does not result, syringing out the sac and duct under a general anæsthetic, or even without, will nearly always be successful, and this may be repeated several times.

For the general plan followed in writing this paper, I acknowledge my indebtedness to Mr. J. Herbert Parsons, of London, who has written on the same subject.

DEFORMITIES OF THE NASAL SEPTUM.

A. J. BRADY, L.R.C.S., Irel., Sydney.

Deformities of the nasal septum may be classified into those which affect the bony part alone; those involving only the cartilaginous portion, and those which include both sections of the septum.

It is important from a practical point of view to determine which class of deformity we have to deal with, before proceeding to treat it. Here we have a valuable aid in adrenaline solution. If a pledget of cotton wool, saturated with the ordinary 1 in 1,000 solution of adrenaline chloride, be inserted in the obstructed nostril for about five minutes, such a shrinkage of the erectile tissue of the turbinates takes place, that a deep view into the nostril is easily obtained. Spurs and deflections situated in the deeper parts of the channel, before invisible, can now be plainly seen. Of course, I presume that the surgeon is using a good reflected light, or an electric head lamp, and that the entrance of the nostril is held open by one or other of the nasal specula generally in use.

Deformities of the nasal septum concern us as surgeons as regards their effect on the nasal channel as a respiratory aperture; their bearing on various reflex neurosies, resulting from intra-nasal pressure and irritation; and as to their effect on the external contour of the nose.

CAUSES OF DEFORMITY.

Deformities of the nasal septum may arise from faults of development. The high arched palate and narrow upper maxilla do not give enough room for the septum, which is thus bent or deflected on its plane. This applies particularly to the bony septum, which is also frequently affected by the next cause, namely, traumatism. Personally, I believe that the great majority of septal deformities is due to traumatism—the injury having occurred so long ago as to be forgotten. A peculiar thing about

these cases is that the full influence of the injury is not felt till several years after its infliction. The obstruction seems to increase as years go on. This may be due in part to the thickening of the buttress, which is thrown out at the seat of injury, and partly to atmospheric pressure gradually working for a long time. A negative pressure is set up in the nostril which is obstructed in front, and the positive, or normal atmospheric pressure in the free nostril slowly forces the septum more to the obstructed side.

RESULTS.

Deformities of the nasal septum are perhaps the most frequent cause of permanent nasal inefficiency in the adult, I say permanent inefficiency, as occasional obstruction is frequently due to turgescence of the erectile structures of the nose. Of course as causes of more or less permanent nasal inefficiency we must not forget nasal polypi in the adult and adenoids of the naso-pharynx in children.

THE SYMPTOMS ARISING FROM DEFORMITIES OF THE NASAL SEPTUM.

The symptoms arising from nasal obstruction are so annoying to the sufferer that he generally seeks relief from them if it can be found. It would carry me too far if I were to discuss the various ills attributed to nasal obstruction. This much, however, I can say from my own experience: hay fever and asthma are sometimes the result of reflex irritation set up by the counter pressure of spurs and ledges of the bony septum, and by high deflections of the cartilaginous septum on the turbinals. The removal of this anatomical cause of irritation and obstruction is necessary for the relief of the symptoms, in addition to the cauterization of the well-known reflex areas. If the pressure caused by spurs and deflections be not removed, the symptoms will recur in spite of the cauterization. I know of cases in my own practice where the symptoms of asthma have disappeared for years after the removal of a septal ridge, which was causing obstruction and intra-nasal pressure. We may call this the "cure" of asthma by intra-nasal treatment or not according to our views on the subject. Personally, I have no doubt of the value of intra-nasal treatment in these cases. Many, I might perhaps say all, of the quack nostrums which enjoy large popular favour for the relief of asthma, owe their virtue to their power of reducing intra-nasal turgescence and of lessening reflex irritation. This power, however, is merely temporary, and the drugs, if persisted in, bring on a vaso-motor paresis, which makes the condition worse than before. By intra-nasal surgery, we attain a more permanent result. We remove the cause—not merely put it to sleep to awake more fretful than ever.

SYMPTOMS OF DEFORMITY OF THE CARTILAGE.

Deflections of the quadrilateral cartilage in many cases cause nasal obstruction. Lateral deviation of the tip of the nose, giving rise to external deformity, is always due to deflection or dislocation of the quadrilateral cartilage; hence efforts to rectify this deformity by attempts to straighten the nose with intra-nasal forceps always fail, except when the injury is recent, as the cartilage, unlike the bone, springs back to its former position. In quite recent cases, I have been able to replace the parts with my finger and thumb, pulling and pressing them into place, and I have heard them go back with a distinct grating sound.

TREATMENT.

In preparing the field of operation, the same anti-septic precautions should be observed as in any other surgical procedure. The face should be cleansed, as an ordinary operation area would be. A moustache, if present, is better removed. The vestibule of the nose must be carefully cleansed, and this process had better be repeated several times, at intervals, some hours before the hour fixed for operation. By the repeated cleansings inspissated deposits are softened and removed. It is remarkable what an amount of dirt will sometimes be found in the vestibule of the nose. Cottonwoolswabs, saturated with a 1 in 2,000 solution of biniodide of mercury, suit for the cleansing. St. Claire Thompson and R. T. Hewlett have shown that the vestibule is the only part of the healthy nose where pathogenic germs are present. The healthy nasal mucous, which is probably bactericidal, is best left undisturbed, so douching is not allowed.

Operations on the nasal septum may be required for the removal or correction of deformities of the bony portion, the cartilaginous section, or both.

For a number of years Bosworth's saw was the instrument most in use for the removal of spurs and ridges of the bony septum. Shortly after Carmalt Jones invented the spokeshave for turbinectomy, I discovered, evidently in common with many others, that it is a very useful instrument for the removal of spurs and ridges of the bony septum. It is very quick and effective. By its means the obstruction can be removed under either local or general anæsthesia. In use the spokeshave is passed behind the projecting ridge, then drawn firmly against the posterior aspect of the same. A series of taps on the handle of the instrument with any slightly heavy body cause the blade to cut like a chisel quickly through the spur or ridge, which, so soon as it lies loose, is removed with a forceps. In some quite recent books I have seen a different and wrong method of using the spokeshave described, namely, by pulling it through. This is quite wrong, as it leads to splintering of the bone, and tearing of the soft parts. The surface left by this operation soon heals over, and is covered with a healthy, and apparently normal mucous membrane, as I have frequently verified years after the operation. I have never seen any of the crusting or dryness often spoken of in books, the writers of which keep on repeating a statement made by some one before, without waiting to see if it is founded on theory or fact. Where the deformity involves the bony septum only, there is no fear that any inconvenience of this sort will result. Where the surgeon elects to do so, this operation can be done by a partial submucous method. An incision is made along the crown of the ridge through the mucoperiosteum, which is then separated from the bone in the usual manner. When the ridge is removed, although some of the mucoperiosteum may be torn, enough is left to cover most of the denuded surface. This hastens the healing process. Where it is possible, it is well to preserve in this way the soft tissues covering the spur. In most cases it is so, but in some where an adhesion with the outer wall of the nose has formed, it is not. In some cases, in addition to a sharp ridge, there is a general curve or bowing of the bony septum to one side, when the ridge has been removed with the spokeshave, the general curvature of the septum can be corrected by pushing it over with an intra-nasal forceps.

DEFORMITIES AFFECTING THE CARTILAGINOUS SEPTUM.

Until recent years, the displacements of the quadrilateral cartilage were the most troublesome deformities of the nasal septum with which we had to deal. Various operations were devised to remedy the deformity. None of them were a complete success. The advent of adrenaline made possible a new operation—submucous re-section—if indeed this can be called a new operation, as the principles of it have, according to Thompson, been traced as far back as Heylen in 1847. Personally, I had been in the habit for a number of years before the complete operation was devised, of removing by submucous method the anterior border of the deflected cartilage, when it projected boldly into one nostril. The complete operation, as now carried out, has only been in use of more recent years. The absence of bleeding secured through the use of adrenaline makes it fairly easy. It certainly is the most satisfactory procedure that has so far been devised for the correction of displacements of the cartilaginous septum. If properly carried out, not only does it completely and permanently remove the obstruction, but it restores the crooked nose to its normal straight line.

“The design of the operation,” says Sinclair Thompson, “is to excise all obstructing cartilage and bone, with any projecting spurs or ledges, while preserving intact the mucous membrane on each side.” This is the design commonly followed by operators, and it appears to me to be on the whole a good one, but if one is to judge from the diagrams which have appeared from time to time in the special journals, the removal of the bony septum has sometimes been carried out with too much zeal. Most of us, no doubt, have seen diagrams showing the removal of practically the whole of the cartilaginous, and most of the bony septum, with the exception of a narrow column of the latter, about a centimeter broad, at the posterior border of the same. I question if this does not to some extent weaken the supports of the nasal arch. The operation, moreover, is a tedious and troublesome one. Surely it is unnecessary to remove any portion of the bony septum, which is neither causing obstruction, nor by pressure setting up reflex irritation. All that requires to be removed is the projecting spur or ridge, and in doing this the whole thickness of the bone need not be removed. I believe that in some cases a better result will be obtained by doing a separate operation on each section of the septum, rather than by one large “window re-section,” removing cartilage and bone by submucous re-section. While operating it is difficult to see how much of the bony septum requires to be removed, and it cannot be of advantage to remove more than is necessary. A large gap in the solid constituents of the septum is left, closed only by a soft curtain, which is apt to flap from side to side. The deflected cartilage is best removed by submucous re-section. If a spur or ridge on the bony septum exist, it may sometimes be better to postpone its removal to a later period, when it can be removed with the spokeshave, which removes only so much bone as is necessary, and does not destroy the whole thickness of the septum. As I have mentioned above, the mucoperiosteum can be stripped off the spur before the removal of the latter.

No stereotyped operation is suitable in these cases. The procedure must be modified to suit each individual case.

It will not be necessary to describe the operation of submucous re-section in detail, as we are all familiar with the steps of the same. I shall, however, mention a few points, on which a discussion will be profitable.

ANÆSTHESIA.

As regards anæsthesia, my earlier cases were done under general and local anæsthesia combined. I soon abandoned this method, as I found that the general anæsthetic rendered the operation more difficult. It is now only used for very timid patients, who will not submit to the operation without it. Local anæsthesia and absence of bleeding are secured by packing each nostril with strips of sterile gauze soaked in equal parts of 1 in 1,000 adrenalin chloride solution, and a 20 per cent. solution of cocaine mur. The dressing is allowed to remain for twenty minutes in the nose before beginning the operation, and short re-applications of the solution will be required during the progress of the same.

ANOMALOUS CASES.

Cases occur where it is impossible from the nature of the deformity to strip both sides of the cartilage of its muco-perichondrium and remove the whole of the displaced structure by any device in one act. In these the anterior displaced portion lies across the opening of the nostril almost at right angles. This displaced portion, after being stripped, can sometimes be lifted out, without the application of the swivel knife. If the cartilage behind be deflected sufficiently to cause obstruction, the stripping process can be extended, and the deflected cartilage removed with Ballinger's swivel knife. The danger of tearing through the mucoperichondrium at the acute angle and leaving a perforation is thus avoided.

It is a mistake to make the incision through the muco-perichondrium too small. It renders the separation of the mucoperichondrium more difficult, and tearing followed by perforation more likely. As the flap is afterwards stitched into position, there is no object in attempting to work through a narrow opening. The separation is begun on the obstructed side, through a curved incision carried through the muco-perichondrium below and in front of the deformity. It is very important to see that we have got to the proper place for separating the structures; this can be recognised by the smooth glistening surface of the cartilage and the ease with which the separation takes place. It is possible, if this care be not taken, to make the mistake of separating the mucous membrane from perichondrium, instead of lifting both structures together from the cartilage. When the structures are sufficiently separated on the obstructed side the cartilage is cut through to the mucoperichondrium of the opposite side, which is then separated in a similar manner. A suitable speculum is inserted astride the cartilage to hold the soft parts aside. Ballinger's swivel knife removes the deflected cartilage, and one or two horsehair sutures are inserted to hold the flap in position. In passing the sutures with Killian's needle, it is best after the needle has come through the anterior flap to draw the suture out of the eye of the needle, not merely to pull the loop through the anterior flap. The needle can thus be withdrawn easily, without dragging on the flaps, as it would do if pushed back with the suture still in the eye. I find strips of gauze impregnated with subnitrate of bismuth a suitable dressing. They can be left in two or three days. They remain sweet, and do not cling to the tissues, thus they can be easily removed. No re-introduction of gauze is necessary.

DISCUSSION ON DR. BRADY'S PAPER.

Dr. KENT HUGHES said—There is one point I would like to suggest—that is the question of the anæsthetic. I have been in the habit of using an infiltration solution rather than the local application of a strong solution, and perhaps we may so avoid some of the dangers of cocain, that is 1 per cent. cocain.

Dr. KIRKLAND (Sydney).—Very often one finds a considerable amount of diffusion of the nasal crest, and when you introduce your elevator, it is very often difficult to raise it completely from the bone right along. That has always been a very difficult part to me. Another point I would like to mention is the removal of the core cartilage. I have been in the habit of making an incision anteriorly, and separating the perichondrium. The view is held by some men that this weakens the support of the nose, but in cases I have done, I have seen no falling in. I think the portion of the cartilage which remains will support the nose. The next thing was the nature of the incision. Fryer's incision I have used on several occasions, but I have almost discarded it now by using an incision anteriorly. I think in many cases it is necessary to remove a good deal of the bone, because in most cases the bone is the place of obstruction. It is more important to remove the obstruction high up than it is an anterior one. These obstructions situated high up are much more important if a patient gets a cold or anything of the kind.

Dr. LANG (Melbourne).—There is one point which was laid down by Lambert Lack when I was in London, and that was that deformities of the septum are produced by pressure from below by the hard palate on account of mouth breathing. When a child breathes with the mouth open, the muscle tissues of the cheeks become drawn down to a slight extent, but still sufficient to act on the young bone, and cause it to be pressed inwards, so that the crown of the upper jaw as a whole is narrowed. At the same time, the tongue is removed from the hard palate, and the mechanical pressure exercised by its bulk is also removed, and in that way removes the counter-pressure to that produced by the cheeks. When the crown is narrowed, the natural result is upward pressure on the septum of the nose, and the yielding cartilage becomes pressed upwards from below. I have seen many cases with an extremely high palate, and very great narrowing, and one that I remember seeing was so narrow that one could not put a pencil in between it. Another point in the causation of deformity is the inequality of development of the cartilagenous and bony part of the nasal septum. With regard to the difficulty in dealing with sharp angles produced in deflections of the septum, I find that most frequent where the angle is vertical. Certainly the difficulty of getting round that corner, and separating the muco perichondrium is not easy. I have found the simplest means is to remove the anterior limb right up to the angle.

Dr. EWING (Melbourne).—I think myself that one of the causations of the deformity of the nasal septum is an hereditary factor. You see it running in families. The aristocratic Norman face seems to me the one most likely to suffer severely. Then I think there is another important factor, one frequently overlooked; that is, the early loss of teeth. It has not been the custom to safeguard the first teeth sufficiently well. I think myself that it is wise when the first sign of caries shows in a child's teeth that the matter should be put into the dentist's hands. In that way you will aid in the better development of the lower and upper jaw, the better development of the palate, and I think in a wider nasal

cavity. I think it is not too late at the age of twelve or thirteen years to try and rectify the narrow palate by handing the child once more over to the care of the dentist. The fraction of an inch is sufficient to make a vast difference in regard to nasal breathing. When I was in Vienna, in 1901, the experience was to remove all one side only. Sometimes when I set out to do a complete operation, that is, separate the mucous membrane on both sides, I have to resort to this operation myself. It is sometimes exceedingly difficult, especially if you have to work far back, but if the maxillary spur is wide, I find it very often possible to do the operation without sacrificing a good deal of mucous membrane. The result in my experience, and I have done somewhere about thirty, is excellent. Is there any age limit to the operation? I am not fond of recommending operation that you may take an hour or more to do on a person of advanced years. The eldest man I have operated on was a man of 52 years. I was driven to it because there was no other way of remedying the condition. He was suffering from severe intense neuralgia in the temporal region, and was referred to me by the physicians at the Alfred Hospital. I found that he had one of the worst septums I had seen, but the worst of it was that the part of the deflection was very high up, causing a good deal of pressure on the ethmoidal region, and no other operation can be employed in such a condition. The result was very good. There was a great deal of relief, although not permanent relief. That may have been because the condition lasted too long. With regard to the anæsthetic, I prefer to do it under cocain; I prefer 10 to 20 per cent. cocain solution. I am using less and less adrenalin as I go on, because I find that the cocain does all I want. In an operation I did a couple of months ago, I also used sub-mucous injections. Immediately I did it, I got very severe symptoms, intense pain in the head, great tightness across the chest. In nervous patients, and in children, I have to resort to a general anæsthetic.

Dr. PABST (New Zealand).—I think with the advent of these new and very artistic sub-mucous resection operations, there is a temptation to interfere with noses which might get quite well if left alone. In the old days, when we had the barbarous procedure of Asches, and other similar operations, where, if not much harm was done, there was very little good done; where the patient had to use a splint; we were rather loth to interfere with these bony septa, but since this procedure has come into vogue, there is a temptation to go for every nose where the septum seems a bit bad.

I am inclined to think that very often we do not pay enough attention to general conditions. I am certain that an enormous number of these cases, on which some form or other of nasal operation is done, could be even more efficiently treated, and perhaps cured, by open-air treatment, and by attention, in some cases, to diet. Certainly, I think that in many cases these might be tried before one goes on to operative measures.

Dr. KENNY (Melbourne).—I have tried the local anæsthesia, in various ways, and, so far as my experience goes, have come to exactly the opposite conclusion, to Dr. Brady. I find it is much more convenient to do my sub-mucous resections under a general anæsthetic. I find I can work very much faster, and get very much better results. I use the cocain in various ways. In some of my cases I have had very considerable difficulty in keeping a bloodless field, and I saw the same difficulty in some cases abroad. For that reason, I find that chloroform helps me better. Men are beginning to think now that you do not want to discuss the operation at the top end of the age; it is necessary to discuss it at the bottom end.

Too many children have been operated on. Some men are inclined to fix the minimal age at about fourteen years, but decided sinking of the nose has been found to occur. With regard to Dr. Brady's moderation, I was present at a meeting of the ear, nose, and throat men in Philadelphia, in discussion on this point. I expected something intensely radical. The whole tone of the meeting was deprecating the extent to which the operation was practised.

Dr. WEBSTER (Melbourne).—I have had a fair experience now of submucous resections, and my conclusion is this, that for all the cases in which we used to do Asches or similar operations, the submucous is the operation.

Of course, there are a number of septal deformities, for which the older operations still remain useful. There are deviations I have seen cut across within quite recent times, and I am sure that a submucous resection would have been better. It would take perhaps ten times as long to do, but it would heal up in a tenth of the time, and there would be no scabbing afterwards, and no subsequent dressing. The patient would be right again in less than ten days. As regards further back on the bony portion of the septum and the removal of some of these deviations by saws, I have seen that done. The complication there to fear is, I think, hæmorrhage. I have never seen any trouble from hæmorrhage in submucous resections. The anæsthetic I use is 10 per cent. solution of cocain in 1-1000 adrenalin. One symptom I have found in two cases, and that is pain across the bridge of the nose. I should like to know if other members have experienced the same thing. The pain is always relieved by the application of cocain. There is persistent neuralgia for some weeks afterwards. As regards the instruments I use, I always have all Killian instruments, and a set of Freer's instruments, for now and then you find something you cannot do without some of Freer's instruments, but as a rule Killian's are quite sufficient. Middleton's forceps I have found very useful indeed. In addition to the cocain, a light anæsthesia of ether is very useful, and can be given quite easily, or just a little chloroform, but I have not found that the actual removal of the bone or of the cartilage is very painful. As regards the age limit, I think one should put the operation off as long as one can, but occasionally you get children with complete blockage of one side, and I think in those cases the submucous resection is the superior operation. I feel sure that it is an operation that has superseded all the crushing and cutting operations, and a man, after he has done a few, will find out for himself all sorts of little points to make the operation much shorter.

Dr. GIBSON (Brisbane).—I am delighted to find that Dr. Brady's attitude is practically identical with my own. I have been satisfied that far too radical measures were often taken. I must say that it must be very seldom necessary to remove much of the bony septum.

I have come to look at it myself that imperfect nasal breathing is the cause of mouth breathing. It is the difficult breathing through the nose that causes arching of the palate upwards, the pulling inwards of the cheeks, and the narrowing of the alveoli. Even in adenoids, I think there is more harm done in the way of nasal obstruction by those who persist in keeping their mouths shut than in those who breathe through their mouths. I must say that I am not anxious to operate on very old or very young people.

Dr. BRADY, in reply, said—I feel greatly flattered with the approval of the members with the somewhat conservative attitude I have taken with

regard to the treatment of deformities of the nasal septum. I thought I might get rather a slating for being old-fashioned. If you take up the journals, you see some of these perfect operations nicely figured out. I think I can get as good a result very often without so much effort, and perhaps better in the end. As to Dr. Hughes's remarks respecting local anæsthesia, I have never tried cocain sub-cutaneously in those cases. I have used the eucaine and adrenalin sometimes; but the other answers so very well that I do not now use anything else. If you are careful in your manipulation, the patient hardly suffers anything. Dr. Kenny's experience regarding the anæsthesia is different from mine. My experience regarding bleeding is that they bleed more with the chloroform than without. I always operate with the patient lying down, with the head slightly raised.

Regarding causes, I think that the majority is due to traumatism. Very often you ask a patient if they had a blow, and they say "No," and perhaps afterwards they will say, "I was thrown out of a buggy some years ago, and was cut about the head, but I do not remember anything about a blow."

THE SELECTION OF THE MASTOID OPERATIONS IN TREATMENT OF CHRONIC MIDDLE EAR SUPPURATION.

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It is not my primary intention in communicating this paper to open up the whole question of operative treatment of chronic suppuration of the middle ear, but rather when the decision has been arrived at as to the advisability of operation to endeavour to select that operation which is most likely to cure the disease with the minimum damage to the organ of hearing.

The responsibility in forming an opinion as to the performance of an operation is increased by the fact that not only has the danger to life to be considered, but also what might be the effect of that operation on the sense of hearing.

Some consideration is necessary in arriving at a conclusion as to the best procedure where the disease involves both ears. This, unfortunately, is far from uncommon. Where the disease is unilateral, and the hearing of the other ear is good, the operation that is most likely to cure the disease, and remove at once the menace to life is the one that has most to commend it, but where the disease is bilateral, or where the hearing of the other ear is impaired, then I think that the uncertainty of the radical mastoid operation, as far as the result to hearing is concerned, must make us consider carefully any method that will give a fair prospect of cure without removal of the drum and ossicles. There may then be justification for an operation which, without removing, yet diminishes considerably the risk to life without impairing the hearing power.

From my experience, I find that on pointing out the advisability of an operation, the first question raised by the patient is, what will be the effect on hearing?

Sometimes fair hearing is present even with long-standing suppurative middle ear disease, and it is, I think, our duty, if it be possible, to choose an operative procedure which will tend best to safeguard that hearing.

C. H. Ballance says in discussing the mastoid operation—"As to the result to hearing, it must be remembered that the operation is not undertaken for the relief of deafness, but for the cure of chronic suppuration in the temporal bone, which, if left, is a constant menace, not only to the hearing power, but also to life."

Ballance, however, in the same article, goes on to say that experience has shown that in a considerable proportion of cases, the operation not only cures the suppuration, but preserves and improves the hearing.

There is no occasion for me to quote statistics on this point. Hammer-schlag, formerly one of Politzer's chief assistants, is quoted by Politzer as having reported on the cases operated on at the clinic during the years 1895-7:—"No influence on the majority of cases; only a small percentage improved, which was offset by a change for the worse in just so many cases."

I have occasionally had cases with marked improvement, but I think it is impossible to predict the result of the removal of ossicles and tympanic membrane, and I think that if these can be preserved, there is lesser probability of depreciation of hearing power.

In testing the hearing before the operation to estimate results, care should be taken to thoroughly cleanse the ear just before making tests, and a test taken within a few months after the operation is of no great value, as much depreciation may ensue later.

The radical mastoid operation has been gradually evolved by the work of Schwartze, Küster, Bergmann, and Stacke. Küster originated what could now be called the antro-meatal operation. The failure of this operation in many cases of suppurative disease lead to Bergmann's and Stacke's modifications, in which the *aditus ad antrum* is exposed, and the tympanum exenterated.

The question at issue is whether by a better selection of cases we cannot find sufficient justification for reversion to the earlier method, which, in the hands of Küster, gave useful results. While in England and the Continent in 1901-2, I found that the complete radical operation was the only operation in vogue. While acting there as assistant at mastoid operations, I was often surprised to find that there was little change in the ossicles, even after prolonged suppuration in the middle ear, but that there was generally much more marked bone disease in the antrum.

In discussing disease of the maxillary antrum at the Adelaide Congress, I pointed out that the assumption of the erect position by man brought the disadvantages of imperfect drainage of the antrum. This applies with equal force to the mastoid antrum. In the prone position, there is a direct line of drainage from the antrum to the eustachian tube; in the erect position the antrum once infected is an admirable incubator, and its effective drainage becomes impossible. In the same manner suppuration in the nose is mainly dependent upon disease of the accessory sinuses, and becomes cured on effective treatment of these, so there are good grounds for the belief that chronic suppuration of the middle ear is maintained in the same way, and that effective drainage of the antrum would be advantageous for the middle ear.

It was as the result of these considerations that I welcomed the communication of an article by Charles I. Heath, F.R.C.S., Eng., to the *Lancet* on the cure of chronic suppuration of the middle ear without removal of the drum or ossicles or the loss of hearing. The article and the results claimed by him are worthy of careful study.

Heath, in this paper, states that one salient feature stood out prominently as the result of his operative experience, namely, the importance of the cavity of the antrum, inasmuch as the persistence of the disease appeared to depend on this chamber rather than on the tympanum, and therefore it became necessary to regard it as the key of the position. The essential points of the operation is the direct drainage of the antrum into the meatus, both practically being made one cavity. Heath in this paper, and in an article in the succeeding year, lays stress on several additional points, such as the shortening of a long aditus ad antrum, removal of granulations, syringing through the aditus, removal of outer wall of aditus and portion of attic wall where there are indications.

Heath has termed the operation in his later communication the conservative mastoid operation. A similar term has been used in Germany for an operation in which the ossicles are left, but the posterior portion of the tympanic membrane removed. Bryant exhibited a patient early in 1906 in New York on whom he had operated similarly.

I am of opinion that there is sufficient justification for the selection of this operation in a percentage of cases of chronic middle ear disease, and with this end in view I have brought forward these notes of cases in which I have performed the operation.

Case 1, 1903.—A. J., æt. 16 :—

Chronic suppuration in both ears existing since childhood; had been under hospital treatment for several years without benefit; complains of headaches in right temporal region, occasionally also in left. Hearing for watch in right ear 2/100, left ear 5/100; at 6 feet medium voice heard in either ear. I was averse to performing the radical mastoid operation, and decided to remove the drum and ossicles on the right side so as to facilitate drainage, and then carried on intratympanic treatment. There was little alteration in the hearing or amount of discharge, the headaches still persisting. I performed the radical operation, and found exposure of dura in roof of the antrum. In two months the cavity was dry, and hearing remained unimpaired.

Headaches persisting on the left side, the patient wished me to operate on that ear also, for which I selected the antro-meatal operation; the antral cavity healed; but persistence of discharge from the tympanum and continuance of headaches forced me to remove the bridge, outer attic wall, and ossicles. I found exposure of dura in the roof of tympanum.

The hearing in this case has been practically the same two years after the operation, and the patient has been gaining a livelihood as nursemaid. Her mistress considered her hearing remarkably good. This case shows the difficulty of deciding when to perform the antro-meatal operation. Judging by my findings, the right ear was the most suitable for the conservative operation, and the left for the complete radical operation.

2. M.S., æt. 18. In 1907 :—

This patient had been operated on two years previously, a radical mastoid having been performed on the left ear, but the discharge had not ceased. Constant definite pain was present in the temporo-parietal region. The hearing for watch was contact /100. There was a perforation in the right drum in the posterior superior segment, and also in the Shrapnell's membrane, with occasional discharge of epithelial mucus and pus. The hearing of this ear was—

Watch 20/100
Rinné + 15"

I first operated on the left ear. On exposure of the tympanum I found portion of matters adherent to inner wall of tympanum and pocketed collections of pus in the antrum, with exposure of dura in roof. The case progressed to complete healing, and the hearing markedly improved three months afterwards.

Watch 50/100
Rinné + 15"

I then performed the antro-meatal operation on the right ear, found lateral sinus exposed, and also dura-mater of antrum. Complete healing with closure of perforation occurred in a few weeks, the dura showing in the antrum, but dry and semi-transparent. The hearing in this ear is—

Watch 70/100
Rinné + 25"
Bone conduction normal.
Rinné + 20"
Bone conduction - 10"

The interesting point in connexion with this patient is that the hearing in the ear in which the ossicles and drum were removed was practically very little below that of the other ear, but re-examination four months later, seven months after operation, showed marked loss of hearing in the former, the tests showing—

Watch 3/100
Rinné - 14"
Rinné - 15"
Bone conduction - 10"

The hearing in the latter ear is unaltered. The headaches continue; Dr. Gault has examined the retinæ on several occasions, but the retinæ are normal.

A case showing excellent hearing from three months after the complete mastoid operation, and later depreciation of hearing.

Æt. 25:—

Radical mastoid operation performed by a surgeon, the after treatment was referred to me; the cavity was quite dry in two months, and the test by watch hearing of the affected ear was 60/100, Rinné + 30", and continued so for some time. I re-examined patient six months afterwards, and found watch hearing contact /100, and a markedly negative Rinné.

Æt. 50:—

Chronic suppurative disease of right middle ear, existing five years, had been under constant treatment, perforation in upper posterior quadrant and in Shrapnell's membrane; headaches in temporal and parietal regions. The hearing was fairly good. Watch 40/100, with a positive Rinné.

I first performed an ossiculectomy, the tympanic cavity soon healed, and was quite dry, but pus still continued to collect, coming from the aditus. After treatment for some months without benefit, the headaches still persisting, I did the complete radical operation, and found the dura-mater of roof of antrum exposed.

The removal of the ossicles lowered the hearing of the watch to contact, and a markedly negative Rinné. The rapid healing of the tympanic cavity, with the condition found in antrum, gives good reason for the opinion that a antro-meatal operation without removal of the ossicles was indicated.

Another case that I have operated upon in which I decided to perform complete radical operation enabled me to come to the conclusion that a antro-meatal operation would not have been sufficient to have remedied the disease.

F.O., æt. 32:—

Suffering for some fifteen years from suppurative disease of right middle ear; had been under careful supervision and treatment for many years. I found the antrum at great depth; it was extremely small, about half the size of a pen, containing a small accumulation of cholesteatomous *débris*, the surrounding bone was very dense and not carious. On removing the bridge and outer attic wall, I found the dura exposed in nearly the whole length, the small size of the antrum and the fairly dry condition of its contents seemed to me to exonerate the antrum as the *fons et origo mali*, and I do not think the antro-meatal operation would have been of much utility.

H.T., æt. 20:—

Double suppurative otitis of middle ear since childhood, large perforations involving lower two-thirds of the tympanic membrane; hearing for voice good. I selected the right ear for the antro-meatal operation.

The condition six months after operation is that the antral cavity is dry, the perforation a pin point; there is very little purulent secretion, the hearing is slightly improved.

I am waiting result before I decide what operation to perform on the other ear. The girl's father is quite deaf from the result of long continued suppuration. M.B., æt. 30 :—

Cured nine months after operation. Chronic suppuration of middle ear left for ten years. Subsequent to operation, antro-meatal, the antral cavity became dry, but the discharge continued, though diminished in amount, and remained present for nine months. I was surprised on my next examination, a fortnight later, to find the perforation healed. Hearing unaltered.

I.R., æt. 8 :—

Chronic suppuration right middle ear since childhood, large perforation, very little of membrane remaining, profuse discharge, headaches, occasional pain in mastoid region. R.W., contact; Rinné, negative. The antral cavity is dry, interior of tympanum moist but no discharge, perforation unaltered. Hearing now R.W., 8/100, Rinné still negative. Hears low voice at 10 feet.

The disadvantages of the antro-meatal operation are, from my experience, the difficulty in determining suitable cases for its performance, and hence the failure to cure the suppurative condition, and the necessity to subject a patient to a second operation.

In cases of bilateral disease, or where in unilateral cases the hearing of the other ear is defective, this latter objection has not so much weight as most patients would be prepared to submit to this for the chance offered of preservation of their hearing. The most suitable class of cases for operation are those in whom there is not much destruction of the drum, and where there is evidence of continuity of the ossicular chain.

Evidences of tubercular disease, of labyrinthine involvement, giddiness, vertigo, and persistent localized headaches, call, in my opinion, for the performance of the radical operation and thorough investigation of the tympanic wall. The advantages of the operation are—shorter duration of operation, lessened risk of injury to the facial nerve, and more rapid healing, and, as far as my experience goes, less risk to hearing.

A SERIES OF (SIX) DISSECTIONS OF THE TEMPORAL BONE (HUMAN) TO ILLUSTRATE THE RELATIONS OF THE FACIAL NERVE TO THE EXCAVATION MADE IN DOING THE RADICAL MASTOID OPERATION.

DISSECTION I.

The triangle of MacEwen is well indicated with the spine of Henle forming its lower border and the posterior prolongation of the zygomatic arch forming the upper border. Both borders well marked.

An operation hole in the bone is seen posterior to this triangle, which leads into the lateral sinus. This specimen was from the Practical Surgery class at the Sydney University, and indicates how the lateral sinus may be opened instead of the antrum by neglecting to chisel in this triangular area. It is beneath this triangular area, and by working inwards and forward that the antrum is found.

DISSECTION II.

Is the temporal bone after removal of the previous exhibit. The bone has been cut from behind forwards through the middle of the mastoid process, and clearly shows—

Firstly, the operation cavity (mentioned before) opening into the lateral sinus.

Secondly, anterior to this, the antral cavity passing forward into the tympanic cavity, *viâ* the aditus and antrum.

In section between the antrum behind, and the tympanum in front, is the external semicircular canal, easily distinguishable as a mound of dense white bone, and in front and below this, the whole arch of the facial canal, from its entrance into the tympanic cavity, to its exit at the stylo-mastoid foramen.

DISSECTION III.

A vertical transverse section just anterior to the posterior wall of the external auditory canal.

The pit of the triangle of MacEwen above the posterior wall of the canal, the antrum deep in from the surface of this mastoid process, and the tympanum and internal ear are all well shown. It is to be seen how the additus leads from the upper and back part of the tympanum to the antrum and how the external semicircular canal forms the floor of the aditus.

The cochlea is cut in sections, and it is seen that its first turn makes the bony boss, known as the promontory, on the inner wall of the middle ear. The facial nerve is shown in the middle ear, and its canal is exposed by a deep cutting to lay bare its whole passage to the stylo-mastoid foramen.

This is interesting as giving an idea of the amount of bone one would need to remove to come on to the nerve after it had left the tympanum and in its downward and forward passage to the stylo-mastoid foramen.

DISSECTION IV.

This is a section made in a similar direction, only a little more anterior to the plane of the posterior wall of the canal.

It cuts the canal through the middle of the floor in its whole length.

The whole of the bone is removed as it would be in doing the radical mastoid operation.

The genu is well shown, and the large superficial petrosal nerve coming forwards.

The carotoid canal and jugular fossa are well seen, cut in sections.

DISSECTION V.

A view of the external surface of the temporal bone, with the cavity in the bone as for the radical mastoid operation. At the bottom of the cavity is clearly seen the antrum, the additus, and the tympanum. The facial nerve is also exposed in its whole length by a deep cutting in the bone.

This specimen will indicate how it has happened that the facial nerve has been injured where the mastoid cells may have had to be opened when they have extended forward under the floor of the external auditory canal.

DISSECTION VI.

A vertical (more or less) transverse section, so that the external auditory canal, the tympanum, and the internal auditory canal are exposed in their whole length.

The facial nerve is here traced passing along the upper wall of the internal auditory canal, then bending sharply backwards (the genu) over the foramen ovale, through the tympanum and the exit near to the stylo-mastoid foramen.

SECTION FOR DISEASES OF THE SKIN AND RADIOTHERAPY.

PRESIDENT'S ADDRESS.

W. McMURRAY, M.D., Sydney,
Dermatologist to Sydney Hospital.

In welcoming you to this, the first sectional meeting of Dermatology and Radiography, of which I have been elected President, I desire to express my grateful appreciation of the honour which has been conferred upon me. It appears to me that we are at a very interesting and important period, for this is the first time in our history that a section has been devoted to these special branches. The general tendency is to specialize in all branches of medicine and surgery, and it must be admitted that concentration of effort leads to a high degree of excellence. This applies to all trades. There are, however, a few men who consider themselves exceptionally endowed with brains, and who pose as universal specialists.

No matter what speciality a man takes up, a solid groundwork of general knowledge of medicine in all its branches is essential, and this more particularly applies to dermatology. It has been said—"He is the best dermatologist who is the best physician." Our specialty is one capable of throwing light in many directions on diseases in less accessible parts. Much to us is within ready reach and full inspection, and can be examined microscopically during life. Nowhere else in the domain of medicine can one learn so much, and with such exactness, of the nature of disease, its remote and immediate causes, and method of cure.

We claim for diseases of the skin a foremost place as a branch of scientific medicine, and without hesitation I assert it beyond all others offers attractions to the student of general pathology. It is evident that, in England at any rate, it has gained its proper position as a department of medicine, worthy of special study and practice, when His Majesty conferred the honour of knighthood on a leading dermatologist, Sir Malcolm Morris.

In order to become anything approaching an expert in diseases of the skin, the power of accurate observation must be cultivated to a high degree. An atlas can teach but little; one must see and feel the lesion in the living subject.

Not long ago I saw a young man suffering from a gumma of his leg, and I noticed he had half his tongue removed for cancer (*sic*). What a tragedy! Can you imagine anything more important than diagnosing a specific lesion of the skin. If these conditions were recognised early, and the diathesis properly treated, it would reduce the number of inmates in our asylums, and save much suffering.

Dermatologists must necessarily be limited to the large centres. The family physician, however, should have a fair knowledge of diseases of the skin, as they frequently crop up in general practice. In small towns, and in vast sections of this great country, the doctor constitutes the only available authority in every disease. How important it is that he be familiar

with the treatment of the commoner forms. Frequently one sees lupus mistaken for rodent ulcer. If the latter were properly excised at the beginning, disfigurement and danger of recurrence would be avoided.

I think the time has arrived when the study of skin affections should be made compulsory in the curriculum. Only a short time ago one of the students in Sydney was confronted with a case of scabies, and he questioned the right of the examiner to examine him on this class of complaint. This is not a desirable state of affairs. Examiners themselves should be alive to the fact that the study of diseases of the skin occupies an extremely important position in all large medical centres.

It occurred to me that it might be of interest to compare some of the more common diseases occurring here with those in England, and to glance at one peculiar to our climate. I am aware that statistics require a good deal of qualification, especially in hospital practice. Frequently cases are only partially cured, and are lost sight of for a time, and are re-registered as new cases. Then again syphilis and lupus often go to the surgeon. In private practice this to a large extent is overcome. The patient would not be counted twice, because he came in a different year. So private statistics are more reliable. In my private practice, lupus vulgaris is extremely rare; most of the cases seen are imported. It occurs in $3\frac{1}{2}$ per 1,000, against 10 per 1,000 in England.

Lupus erythematosus is less than half as common—

$$\begin{aligned} 38 \text{ in } 2,000 &= 1.9 \text{ per cent.} \\ 127 \text{ in } 5,000 &= 2.54 \text{ per cent.} \end{aligned}$$

I think it commences here at an earlier age; it is not unfrequent to see well-marked cases at 15. Many of my cases I could trace to traumatism, scratches, blow, &c.

Rodent ulcer is an extremely common disease with us, and frequently begins in early life. In one patient of mine, aged 16, it commenced on a mole following the application of lunar caustic.

Comparing my own with Crocker's statistics, I find he had only 14 in 10,000 hospital cases, 34 in 5,000 private, whilst here, I had 108 in 7,000 hospital, and 50 in 2,000 private cases.

A fairly common disease with us is keratosis, which occurs on exposed parts, as the face, neck, back of hands, and forearms, especially in fair people, who sunburn easily. It commences as a dry, greyish, scaly patch, pin-head to split pea in size, raised above the skin, rough to touch, and when scraped off leaves a bleeding surface. The scale quickly reforms, and the patch gradually enlarges. The lesion may remain stationary for a long time, but frequently takes on a malignant action, and if not dealt with in a radical manner may involve the neighbouring glands, which may require an extensive surgical operation, and may even end in death. There is no doubt strong sunlight accounts largely for these conditions. It destroys the tubercle bacillus, and therefore lessens the tendency to lupus vulgaris, but acts as an irritant, causing the keratosis.

Until a few years ago scabies was a rare disease, now it is quite common.

Syphilis, which plays a very important rôle in the practice of every dermatologist, is very prevalent in Australia. My statistics compare in an alarming way with those of Crocker. In his hospital practice it occurs 5.4 per cent., in private 2.54 per cent., as compared with mine—12.5 per cent. in hospital, 8.65 per cent. in private.

In quoting from the Blue Book of the Navy on venereal disease for the year 1901, the Australian station reaches the top compared with other naval stations. The case ratio under this heading (venereal disease) was 214.75 per 1,000, an increase of 58.57 as compared with last year, and of 56.75 in comparison with the average ratio for the last nine years.

Sydney is mentioned by nearly all the medical officers as the place where these diseases are most prevalent, and during the year inquiries were set on foot to devise some measures to check the pest in this port. It is worthy of note that Brisbane, where a modified Contagious Disease Act is in force, is practically free from these diseases; and the medical officer of the *Pegasus* reports that at Noumea, where the French authorities rigidly enforce a Contagious Disease Act, not a single case was contracted, although leave was freely given to the crew during all days of visit of the ship to this port.

Now let us glance at the modern advances in our own speciality. Like all other branches of medicine, it has made rapid strides. I might mention the discovery of the tubercle bacillus by Koch, bacillus of lepra by Hansen, the spirochæta pallida of Schaudinn, Finsen's method of treating lupus by light, discovery of radium by Curie, the various serums and opsonic treatment by Wright, liquid air, liquid carbonic di-oxide gas, Bier's local hyperæmia, Sabourand's research on ringworm, spirochæta pertenuis of yaws by Castellani, and last, but not least, the X-rays.

The X-rays were discovered in 1895 by a physician, Professor Roentgen, of Wutzbourg, and applied therapeutically for the first time by Freund and Schiff, of Vienna, in January, 1896, for removal of a hairy mole from the back.

Since this epoch, these applications have extended all over the world. The rays have been applied more or less to all kinds of skin, and many internal diseases. They have a selective action for the hair papillæ, cancerous cells, and pathological tissues in general. Their use in diagnosis of fractures and location of foreign bodies (almost at once) became general. At this early period, there was no guide to the technique of their application, or means of measuring the dose, or quality of the rays. As a result, indifferent effects were obtained, or results which were disastrous to the patient. The first distinct advance was made by Kienbock in 1900. He demonstrated that the rays from a Crooke's tube possessed certain special qualities independent of concomitant and electrical phenomena. He pointed out the great importance of molecular tension of the tube, and described the hard and soft tube. Then Becquerel devised the spintometre, which gives approximately the degrees of penetration of the rays. Their exact value was made known by Benoit's radio-chromometer. In 1902, Hotznecht, at the Congress of Radiography, at Berne, made known his pastilles, by which we are able to estimate the quantity of X-rays absorbed. As time went on, the construction of the tubes became more perfect. The tubes first employed were very primitive. They could not be regulated. Soft at first, and rapidly becoming hard, so that in a short time they became useless. These were replaced by tubes which could not be regulated or maintained constant, *i.e.*, Muller's, or more recently Chaband's, which is still more perfected by Villard's osmo regulator. Leaving the stage of empiricism, in a few years we see radiography develop into an exact science, and we have to-day in it an extremely active therapeutic agent, which, in the hands of experienced men, has little danger attached to it. There is no doubt the triumph of the future will be the production of rays of greater penetrative power, which will be of value in deep-seated diseases. Like all other new re-agents, it has been much abused.

The application of the X-rays can only be made by a medical man, who has become expert in their use, and who has familiarized himself with the lesions suitable for their application. Unfortunately, there are members of our profession occupying distinguished positions who do not hesitate to send their patients for X-ray treatment, diagnosis of fractures, location of foreign bodies, &c., to unqualified persons, when qualified men, who have devoted their entire labours to this speciality, are available.

THE TREATMENT OF SYPHILIS.

W. McMURRAY, M.D.,

Hon. Dermatologist, Sydney Hospital.

As I mentioned in my address to this section, syphilis is very prevalent in Australia. In my own experience it constitutes $12\frac{1}{2}$ per cent. in hospital and $8\frac{3}{4}$ in private practice.

Next to tuberculosis, it is, perhaps, the most important disease that affects mankind. It has a wide distribution, and flourishes most luxuriantly in countries which have attained the highest degree of civilization. It attacks mainly the young, and interferes with the healthy procreation of the species.

In a young country like this, it is desirable to endeavour to stamp it out, and treat it efficiently in order to avoid its far-reaching and disastrous effects.

I may say, at the outset, I have nothing new to tell. I am simply giving my views and experience of the methods, that I employ, and what I have found most effective.

As far as my experience goes, syphilis in Australia is of a mild type. It is very rare to see a case of malignant syphilis.

Prophylaxis of Syphilis.—The *spirochæta pallida* has not so far been cultivated, although Levedati has been successful in cultivating the spirilli of relapsing fever, and fowl septicæmia, which belong to the same group, so far there is no vaccine against syphilis. I will not weary you with a detailed account of the various chemical agents employed as a preventive measure. Suffice it to say, that Drs. Metchnikoff and Roux have conclusively proved by experiments that a 33 per cent. calomel ointment employed from one to eighteen hours after inoculation has proved successful.

This ointment as a prophylactic should be carried by those whose profession exposes them daily to the risk of contracting syphilis; *i.e.*, accoucheurs, midwives, medical men, dentists, and nurses.

I would advise surgeons to wear always finger stalls in vaginal and rectal examinations; as chancre on the finger, especially if one has a piece of loose skin, or abrasion is very liable to become affected. I have seen five cases of this nature during the last few years.

Chancre.—I do not know what the experience of those present is about soft chancres, mine is that they are rare—nearly all the cases that I come across are hard.

The question arises, when should specific treatment be commenced. Fournier's reply to that is, as soon as it is diagnosed. In doubtful cases

one should certainly wait for constitutional manifestations. Now that the spirochæte pallida is recognised the pathogenic microbe, the diagnosis can be confirmed by its presence.

In the present state of our knowledge, there are only two anti-syphilitic drugs—mercury and iodides. Before placing the patient under a course of either of these remedies, it is well to attend to the general health.

General Health.—It should be borne in mind that weakly cachectic individuals, and those suffering from tuberculosis and malaria are bad subjects for syphilis. The same applies to old people. Fournier used to say, if you are going to get syphilis, get it when you are young. Alcohol and syphilis are a bad mixture is another of his terse sayings. Alcohol should only be given in great moderation, and under conditions which tend to improve their digestion and general health.

The weight should always be taken, and carefully noted. The urine examined. I have known a patient, who was suffering from Bright's disease, die from the administration of five grains of calomel.

It is a good thing to remember that pregnant women resist treatment, and very often the symptoms do not disappear until the uterus is emptied of its contents.

I have noticed many of my patients greatly benefited by surf bathing, which has come into vogue recently in Sydney.

Clothing should be warm, and sudden changes of temperature avoided.

No restriction is made in diet during treatment, with exception fruit is forbidden until I find out how the mercury is borne.

Mouth.—Attention to the mucous membrane of the mouth is of the utmost importance, so as to avoid mercurial stomatitis.

There is great diversity amongst patients in this respect. Some are very liable to it, and others are exempt. Tartar should be removed from the teeth, stumps extracted, caries of teeth filled. Teeth should be brushed with a soft brush two or three times daily with chlorate of potash tooth paste, and the mouth washed out frequently with a solution of chlorate of potash. All ulcers should be dried and cauterized with a solution of nitrate of silver or 10 per cent. solution of perchloride of mercury in spirit. The latter should be used by the physician himself. For this purpose I use a long stick at each end of which is wrapped a piece of wool, one end is used for drying the sore, and the other making the application.

Smoking should be forbidden if there are any sores in the mouth. During the time the patient is under treatment, the first thing I examine is the mouth. One should always look out for intoxication with the drug. A slight degree of stomatitis is not of any consequence.

Method of Giving Mercury.—There are four principal methods of giving mercury—mouth, inunction, hypodermic, and fumigation.

Administration by Mouth.—In this country, in England, and France it is undoubtedly still the method of preference with the great majority of physicians. The pill form is by far the most convenient. They should always be made fresh by the chemist. Tabloids and sugar-coated pills on the market I do not like. One of my patients complained to me of griping pains and passing hard round masses like small peas. I got her to bring me some, and had them examined by a chemist, who pronounced them undissolved mercurial pills.

The preparations I favour are the green iodide, or hyd. c. creta guarded with opium. The dose depending upon the weight and physique of the individual. One would not care to give the same dose to a delicate woman

as he would to a strong full-blooded man. The drug should be pushed to tolerance, and given uninterruptedly for six (6) months, and then I follow Fournier's chronic intermittent method, giving it every alternate month to the end of the second (2nd) year. Third year four (4) months in all, two months' rest between each month. Fourth year mercury alone, or mixed treatment for one month every sixth month. Fifth year under observation. That is, if I can get the patient to underake it.

Fournier is distinctly opposed to giving mercury for a long period continuously. He says, "It is the same with mercury as with other remedies, its continuous use induces a condition of tolerance which lessens, and finally destroys its therapeutic effect."

During the course the patient's weight should be taken, and a note made at each visit. Care should be taken that the preparation does not cause any gastro-intestinal irritation, and it should be changed until some form is found to agree.

For patients living at a distance who cannot attend, the perchloride of mercury is the best, because it seldom produces ptyalism. It should be given in solution by itself, not with any vegetable, as it is liable to undergo change.

Inunction.—This method of treating syphilis is one of the oldest, and I believe the best. By this method the mercury seems to remain longer in the system, and the patient is less liable to relapse. It is preferable in syphilitic pregnant women, and in those who have feeble digestion, or may require internal treatment for other constitutional disease.

The method is often carried out in a haphazard way. It should be given with precision, as in other methods. The quantity of mercurial ointment for each rubbing should be weighed out, and wrapped up in waxed paper by the chemist. The dose varies with the size and weight of the body, and the susceptibility of the individual, half to two drachms dose for an adult, fifteen (15) to thirty (30) grains for a child.

The rubbing should be done at bed-time by the patient himself, or an attendant wearing a rubber or leather glove. Half of one of the packets of the ointment should be placed in the flat of each hand and rubbed in for half-an-hour or twenty minutes, or until the ointment disappears, or skin becomes dry. The following regions are rubbed:—

- 1st. Inner surface of both legs.
- 2nd. Inner surface of both thighs.
- 3rd. Both loins.
- 4th. Inner aspect of both fore arms.
- 5th. Inner aspect of both arms (upper).
- 6th. Back.
- 7th. Bath.

This constitutes one cycle. He should wear some underclothing night and day. If the patient is very hairy these parts are avoided, as the ointment is liable to produce a folliculitis. In the morning he can take a bath, if he desires, but not to wash the part where the salve has been rubbed in with warm water and soap.

During the course the general health should be well maintained. Bowels acted on daily, and special care should be taken with the mouth and teeth, chlorate of potash paste or gargle being used the entire time.

This is the method employed in Vienna, and I have no hesitation in saying it is the best.

The number of cycles varies with the form and intensity of the disease, generally speaking a course of six to eight weeks at one period is found sufficient.

There is one objection to its use, and that is, it is a dirty method, and liable to excite suspicion. This has been overcome by Gowers. He prefers inunction with 10 per cent. hydrarg. oleate, rubbing in one drachm twice daily for three or four days, then once daily until the end of the week. If the gums show no sponginess, resume two rubbings daily until they do.

He advises the frictions to be made with flannel, and lets the first inunction be two drachms, using the same piece of flannel subsequently. He advocates rubbing to be made as near the lesion as possible; for instance, close to the scalp if it be the brain, and down the back if the spinal cord be affected. He recommends the treatment to be energetic, brief, but not continuous. It should be stopped at the end of eight weeks or so, and renewed again after two, four, or six months, and that the patient should have three to four weeks' treatment with iodide of potash every four months during the first year after any true specific symptom, and say every six months for three or four years. (Gowers' Syphilitic Disease of Nervous System.)

Of course inunction should be stopped in any febrile disturbance, or hæmoptosis in tubercular patients.

Injection.—We come now to the treatment by intra-muscular injection. I may say at once, that this method of treatment is only suitable for obstinate cases. As a rule it is painful, and disliked, although some of my German patients prefer this method. The soluble salts are not much used. They have one great objection, as they have to be given daily or every other day. One has in practice to consult the patient's pocket as well as his disease. Few of my patients could afford these frequent visits.

For a long time I was in the habit of using the salicylate of mercury, but now I only employ grey oil or calomel. These injections at first cause more or less pain, but after a time they do not complain much. Calomel is only employed in severe visceral affections, and tertiary disease of the tongue. Lambkins' formula of grey oil, put up by Oppenheimer, is handy and convenient. The calomel preparation contains too much wax. It is better to use it suspended in olive oil. These injections are given once weekly in the buttock.

For ordinary run of cases I do not think this method will supersede the older methods.

The course generally followed is:—

1st Year.—Three courses of six weeks each.

2nd Year.—Same as first.

3rd and 4th Years.—One month.

Fumigation.—I have not much experience in this method of treating syphilis. It is only suitable for hospital cases. Patients will not go to the trouble, or spend the time for these baths at home. Still I think it is a very satisfactory method of treating obstinate cases. Local fumigation I often use for sores.

Late Manifestations, included under the term tertiaries. I always employ mercury, preferably inunction with iodide of potash. The American method of prescribing the latter drug, in the form of a saturated solution, is by far the best, and most convenient way. They dissolve one

ounce in five and a half drachms of hot water. This results in a saturated solution containing one grain in one minim, a drop from a medicine dropper will contain a little less than one grain. It is best given in milk, in ascending doses, until improvement follows. Ten drops three times daily after food is the usual dose to begin with, and increase daily one or two grains.

The tabloid form is not a good way to give it. If swallowed undissolved, it will cause heartburn for some hours.

A severe course of iodide of potash should not be continued longer than a month or six weeks. This should be followed by an interval of three to four weeks, and then the treatment begun again.

It is well to remember that it is not good practice to dust open sores with calomel during the time a patient is under its influence, as a good deal of pain will follow, due to formation of the bin-iodide.

I have already mentioned that sea bathing is an excellent adjuvant to other therapeutic measures.

For patients who can afford it, at the close of the treatment I recommend them a course of sulphur baths at Rotorua.

Congenital Syphilis.—I have not time to enter into the nursing of the syphilitic child, and treatment of congenital syphilis in detail. As to the best method of giving mercury, I have never had occasion to diverge from the old way of applying the blue ointment under the binder.

In conclusion, I have attempted to describe nothing new. I recognise that this brief and incomplete summary of some of the means at our disposal for treating syphilis must be like a beaten track to most of you, who are doubtless quite familiar with their employment.

YAWS (FRAMBOESIA TROPICA).

ALEXANDER ROBERTSON, M.B. Ch.M.

Gilbert and Ellice Islands Protectorates.

Yaws is prevalent in all the Gilbert and Ellice Islands. Though more particularly a disease of infancy and childhood, adults, and even old people, are also affected. It is slightly more prevalent among females than males on these islands.

According to Mr. G. M. Murdoch, an official of the Protectorate, who has been resident in these islands for thirty years, and who has an intimate knowledge of the natives and their diseases, yaws was introduced into the Gilbert and Ellice Islands by natives returning from Samoa and Fiji twenty-five or thirty years ago.

Ætiology.—As yaws is very contagious, it is very probable that infection is due to a specific micro-organism transmitted either directly by inoculation of the abraded skin, by the pus on the papules of those suffering from the disease, or indirectly by flies, which are invariably found in large numbers clustering on the sores of those affected by yaws. The specific micro-organism is believed by many to be the *spirochæta pertenuis* discovered by Dr. Aldo Castellani, of Ceylon, which is apparently morphologically identical with the *spirochæta pallida* of Schaudinn.

Last year I made examinations of films prepared from the pus on the papules of thirty cases of yaws, and got the following results:—

- (a) *Staphylococcus albus* and *aureus* in large numbers in all the films.
- (b) *Streptococci* in large numbers in all the films.
- (c) *Bacilli* with square ends containing spores in all the films.
- (d) Large cocci. in pairs, in all the films.
- (e) The *spirochæta pertenuis* of Castellani in twelve of the thirty cases examined.
- (f) Divisional forms of the *spirochæta pertenuis* in sixteen cases.

Some *spirochætes* had a ring-like head, with one side of the ring thickened like a signet ring. In some varieties the spirils began close to the ring head; in others there was a straight interval before the commencement of the spirillation.

Observing that large numbers of flies infested the houses of natives suffering from yaws, and were in frequent contact with the purulent secretions of the papules on the bodies of the inmates, I made the following experiment to ascertain whether or not flies were carriers of contagion. The patients in the yaws houses in the Central Hospital at Tarawa were instructed to refrain from washing their bodies and smearing the papules with ung. hydrarg nit dil. (which is the practice in the hospitals under my charge), in order that flies might have an opportunity of resting on the papules and getting contaminated with the micro-organisms in the secretions. They were then told to catch the flies on the papules and place them in sterilized glass jars. About 200 flies were caught in this manner. I then filled the jars with sterilized water and shook the contents vigorously, in order that any bacteria adhering to the bodies of the flies might be washed off into the water. Twenty-four hours later I centrifugalized 10 c.c. of the water and made smear preparations from the precipitate. Twelve slides were deeply stained with Giemsa, carbol fuchsin, or gentian violet in acetozone, twenty to thirty minutes being spent in examining each slide. In all the slides examined the same micro-organisms (pyogenic bacilli, &c.), were found as were present in the examination of the pus obtained direct from the papules as described above, and in four slides only did I find well formed *spirochætes*, though the divisional forms were present in eight.

From this experiment I ventured to draw the following conclusions:—

- (1) The house fly is capable of carrying the virus of yaws on its body or limbs, and should it alight on an abraded surface on the body of a person not protected by a previous and not too distant attack of the disease, infection would probably follow.
- (2) It is necessary to prevent flies coming in contact with the sores on the bodies of yaws patients, lest they carry contagion to others on whose bodies there may be abrasions. This is effected in the native hospitals under my charge by washing the bodies of the yaws patients twice daily with soap and warm water, and afterwards smearing the papules with ung. hydrarg nit dil.; and that this method has proved effectual is shown by the fact that at Tarawa Hospital, established over three years ago, there has not arisen a single case of yaws in the General Hospital, although it is only fifty yards distant from the yaws compound.

In the above described films I also noted numerous bodies about three to four times the size of an ordinary pus corpuscle, which I think of sufficient importance to warrant description, in view of their possibly bearing a close relation to the *spirochæta pertenuis*. These bodies, presumably protozoa, were irregularly round or oval in shape, and were surrounded with a delicate investing membrane, which in some instances had ruptured. The cytoplasm was composed of fine granules lying in a network of fine fibrils. Two or more round or oval nuclei were present containing nucleoli, also vacuoles and refractile bodies. In nearly all of these protozoa spirilla and chain-like bodies were seen either in the cytoplasm or in the neighbourhood of protozoa whose investing membrane had ruptured and given exit to their contents. The number of spirils in these spirochætes ranged from four to eight. The spirochætes had a ring head. They seemed to be capable of escaping from the protozoa without a preliminary rupture of the investing membrane, as some were seen with their head within the protozoan and the spiril portion of their body outside. In the cytoplasm there were also rod-like bodies with rounded ends or one extremely pointed containing one to three spores or nuclei, as well as crescent bodies with spores or nuclei at either end or at the bend of the crescent.

Some of the protozoa were seen to be in close contact as if a process of sexual congress were taking place, the limiting membrane being absent at the point of contact.

The presence of these spirochætes in the above described protozoa raises the question—Are they the *spirochætæ pertenuis* of Castellani, which they closely resemble? If they should prove to be so, I should be inclined to consider the protozoa as the parent bodies of the *spirochætæ pertenuis*, which are consequently only a stage, possibly the final one, in the developmental cycle of this protozoon.

Symptoms.—In the description of the symptoms of yaws, it is convenient to divide the disease into four stages—An incubation stage, a pre-eruptive stage, an eruptive stage, and a late stage or period of sequelæ.

The Incubation Stage.—By the incubation stage I mean the period between the receiving of a skin abrasion or the appearance of an ulcer on the skin and the development of the primary papule or mother yaw on this abrasion or ulcer. The duration of this period is of necessity uncertain, owing to want of attention on the part of the natives, and their vague ideas as to the lapse of time. Roughly, it may be regarded as varying from two weeks to six weeks. The primary papule or mother yaw, as mentioned above, occurs where there has been an abrasion of the skin, which is usually on the arm or leg, the natives being liable to injuries when fishing on the reefs or walking through the bush, on account of their limbs being uncovered. The dorsum of the foot, between the toes, the elbow, and the extensor aspect of the arms are favourite situations for the primary papule. Occasionally the primary papule appears on the female nipple, when the mother has been nursing a child with yaws on its lips. Another situation where the primary papule is found is the upper arm, where the mother rests the child's head.

I have never seen the primary papule on the male or female genitals. The mother yaw, or primary papule, is composed of granulation tissue, and, as a rule, does not attain the dimensions or prominence of an ordinary papule. Though covered with a purulent secretion, a hard yellow crust does not appear on it, at least in my own experience. It disappears in about a fortnight, leaving a whitish scar, similar to what is left by a

superficial ulcer. In other cases it is impossible to recognise a definite mother yaw, a sore having the appearance of an ordinary ulcer being the only lesion present prior to the appearance of the general papular eruption.

The Pre-eruptive Stage.—This period constitutes the time between the appearance of the primary papule and the general papular eruption. It appears to vary between eight or ten days to a fortnight. During this period there is a slight rise in temperature, nocturnal headache, pains in the bones, and, in the case of children, often vomiting and diarrhœa.

Eruption Stage.—In ten days to a fortnight from the appearance of the mother yaw a general eruption of small papules about the size of a pin's head is seen. These papules, which occur in successive crops, rapidly increase in size, assume a wart-like appearance, and exude a clear fluid which afterwards becomes purulent and forms a firm yellow crust. On removal of this crust a raw surface is exposed, showing enlarged papillæ similar to those of an ordinary wart. The mature papule varies in size from a quarter of an inch to an inch in diameter. In some instances the papules remain discrete, in others they coalesce, and form condylomatous masses round the lips, nostrils, anus, male and female genitals, axillæ and groins. I have never seen papules on the hairy scalp, though they often appear at the junction of the skin and hairy scalp. Yaws frequently develop on the soles of the feet, where, owing to irritation of walking and a tendency to burrow under the thick skin of the soles, they often cause suppuration and great pain from pressure on nerves, which results in partial or complete lameness. In these situations the yaws are very intractable to treatment, and it is necessary to soften the skin with a sod. bicarb. solution, and afterwards scrape away the superjacent skin with a Volkmann's spoon under an anæsthetic in order to gain access to the yaw underneath. Underneath and around the finger and toe nails are favorite situations for yaws where they cause much pain.

In cases of neglected yaws the papules which have coalesced tend to ulcerate; but I have never seen the extensive and deep ulceration and necrosis, similar to the tertiary lesions of syphilis, *e.g.*, necrosis of nasal and palate bones, described by some writers as due to yaws. In three and a half years' experience in the Gilbert Islands, where I have personally treated over 400 cases of yaws at the Central Hospital at Tarawa, as well as having seen several hundred cases on other islands of the Gilbert and Ellice Groups on my official visits, I have never yet observed the extensive ulceration and necrosis of tissue described as occurring in the late stages of yaws, and which some observers are inclined to consider a proof of the identity of yaws and syphilis.

Any such case of extensive ulceration resulting in cicatricial contracture of joints, closure of mouth and nostrils and necrosis of bones, which I have seen in the Gilbert and Ellice Islands were due to syphilis, which is prevalent in its congenital form, and has been for generations in all the islands of the groups, the disease being probably introduced by the Spanish adventurers who visited the Gilberts in the fifteenth century, or possibly earlier, by Malays who may have drifted or sailed to these islands. I have seen many cases of yaws occurring in young persons whose parents were syphilitic and who themselves had syphilitic cicatrices on their bodies. I am inclined to think, with all due deference to those who describe necrotic changes similar to those of the tertiary stage of syphilis, that such cases were really a combination of yaws and syphilis, *i.e.*, yaws occurring in a case of congenital syphilis, the virus of the latter disease having been given an opportunity of exercising its virulent

properties owing to the resistive powers of the patient being lowered by the action of the toxins of the specific micro-organism of yaws. That this explanation is probably correct is shown by the recent successful inoculation of syphilitic monkeys with the virus of yaws by Castellani, of Ceylon, and the subsequent development of the latter disease. This is a point which I consider has not been sufficiently considered by those who regard the two diseases as identical. Another fact of practical importance which I have observed among the Gilbertians, and which I consider is very suggestive that the two diseases are distinct, is the ease with which yaws can be cured by appropriate treatment, as compared with the protracted course of medication necessary in cases of syphilis in these islands. I shall refer to this later when discussing the treatment of the disease and the differential diagnosis of yaws and syphilis.

The papules, under appropriate treatment, disappear in three to eight weeks, leaving white discolorations, which fade and darken under the influence of sunlight, those round the mouth, anus, and axilla being the last to be absorbed.

The papules themselves are not sensitive, though when there is ulceration there is pain on pressure in the circumjacent area. A peculiar fusty odour exudes from the bodies of those suffering from yaws. In children there is a tendency for the yaws to appear in greater numbers on the trunk than is the case in adults. On the trunk the papules often coalesce and form rings with a clear area of skin in the centre.

During the eruptive period there are various constitutional affections, principally anæmia with subsequent loss of appetite and debility. The pains in the bones and headache are often so severe as to prevent sleep. In other cases the general health is quite unaffected by the disease. In cases of long standing which have not had suitable treatment there is a tendency to the development of tuberculosis, glandular or pulmonary, diseases which are common in the Gilbert Islands, accounting for two-thirds of the deaths in these islands.

Late Stage or Stage of Sequelæ.—The principal sequelæ occurring in this stage is neuritis, which is often so severe in the lower limbs as to cause partial or complete lameness. Pressure along the course of nerve trunks causes pain. It disappears rapidly under large doses of potassium iodide and the daily application of the Faradic current. Phthisis pulmonalis supervenes in cases of long standing which have had no suitable treatment, and are debilitated. It usually has a fatal termination.

Septicæmia.—A septicæmic condition occasionally ensues in cases of neglected yaws, where there is a copious eruption and purulent secretion. In one instance this septicæmic condition ended fatally.

The death rate of yaws in my own experience has been nil, apart from the fatal terminations due to intercurrent diseases, *e.g.*, phthisis.

Diagnosis and Differential Diagnosis from Syphilis.—The chief points in the diagnosis in a case of yaws are:—

1. The eruption of small papules, which increase in size, rapidly assuming the appearance of warts, with a crust of hardened pus on their surface, the papules forming condylomatous masses round the mouth and anus, or in the axilla or groin;
2. There is a rapid disappearance in a few weeks of the papules under large doses of potassium iodide, contrasting in this respect with syphilitic lesions among the Gilbertians, which require months of treatment with potassium iodide before a cure is effected.

3. That there is the absence of the sore throat, alopecia, iritis, and the polymorphism of skin affections so characteristic of syphilis. With the exception of a desquamative dermatitis, I have not seen any skin lesion in yaws other than the papular eruption characteristic of yaws.
4. That ulceration, if any, is superficial, and does not present the "punched out" cavity and glazed margins so characteristic of syphilitic ulcers.
5. That gummata, nodes, and periosteal thickenings are not found in cases of yaws, while such lesions are found in abundance in syphilitic subjects among the Gilbertians.
6. That yaws is never congenital, while syphilis is.
7. That yaws occurs in those who are syphilitic, and who have the scars of old syphilitic lesions on their bodies.
8. That a second attack of yaws is not uncommon, while a second attack of syphilis is either very improbable or exceedingly rare.
9. That the primary sore in yaws is extra-genital, while the primary sore in syphilis is more frequently on the genitals than on other parts of the body.
10. That the inoculation of syphilitic monkeys with the virus of yaws is followed in due course with the development of the latter disease.—(Castellani.)

Treatment.—Cleanliness is essential in the treatment of yaws. This is effected in the hospitals under my charge by providing each hospital with a twenty-gallon iron caldron, in which water is boiled, the caldron being kept in a small native house open at the sides. The patients are instructed to wash their bodies twice daily with carbolic soap, and afterwards to anoint the papules with ung. hydrarg. nit. dil (1-3 vaseline), a small box of which is given to each patient, or the mothers or guardians in the case of children. The ointment serves a double purpose, acting as an antiseptic, and preventing the growth of pyogenic organisms in the secretions on the surface of the papules, as well as preventing flies carrying contagion as mentioned in the earlier part of this paper.

Medicinal treatment consists in the administration of potassium iodide in large doses. Adults receive 10-20 grains of pot. iod. thrice daily; children, 2-10 grains thrice daily, according to age. The Gilbertians stand large doses of potassium iodide well, and I have only seen two cases where symptoms of coryza were present, after several weeks' treatment of 20 grains thrice daily. Where there is anæmia and debility, ferri et quin. cit., or Easton's syrup, syrup of the chloride of iron (P.D. & Co.) in the case of children, and cod liver oil, or petroleum emulsion (P.D. & Co.), is given in addition.

Yaws on the sole of the foot are treated by dressings of Sodæ bicarb. to soften the skin. The patient is then anæsthetised, and the yaw exposed by thoroughly scraping away the thickened skin and granulation with a Volkmann's spoon. The cavity formed is packed with gauze till the suppuration has subsided, when the yaw is smeared with ung. hydrarg. nit. dil., as usual. Yaws on the feet are very persistent unless treated in this manner. Neuritis is treated by the Faradic current and massage. For several months, when I first came to the Gilberts, I tried preparations of mercury, *e.g.*, hydrarg. perchlor., hydrarg. *cum* cret., hydrarg. binoid, mercuriol., &c., but they had no appreciable effect on the papules, or the headache and pains in the bones which the patients especially complain of.

The contrast with the rapidity with which these symptoms disappeared under potassium iodide was so great that I was compelled to give it up, as the patients were beginning to ask why the others treated by pot. iod. alongside them got well so soon. I also tried tonics without potassium iodide, but there was no improvement without the addition of potassium iodide.

The average time the patients are under treatment is five weeks. Some cases have completely recovered in three weeks, and others have been in hospital for two months, the latter being those which were debilitated and had received native treatment. The natives treat yaws by dressings of leaves of plants which have astringent properties. This treatment has little effect, if any, on the condition of the papules, probably owing to the want of cleanliness, as a result of which there is inflammation of the circumjacent skin, and superficial ulceration, also neuritis in an aggravated form.

Pathology.—Microscopic section shows that the yaw papules are composed of granulation tissue. There is great enlargement of the papillæ, and extensive round cell infiltration in this layer, the corium, hair follicles, and glands showing less signs of inflammation. The coats of the blood-vessels are thickened.

[NOTE.—Dr. Robertson has not had opportunity of revising proof.—ED.]

THE RATIO OF THE VARIOUS SKIN AND MUCOUS MEMBRANE LESIONS OF SYPHILIS.

By A. W. FINCH NOYES, F.R.C.S.

These observations were made from 1,000 cases of syphilis occurring consecutively in my practice; 900 from the department for diseases of the skin at the Melbourne and Alfred Hospitals, and 100 from my private patients, including 600 males and 400 females. The lesions of the skin and mucous membrane presented themselves in the following order:—

| | | | | | |
|---------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|
| Macular | ... | ... | ... | ... | 144 |
| Papular, with its modifications, papulo squamous | | | | | |
| circinate | ... | ... | ... | ... | 355 |
| Pastular | ... | ... | ... | ... | 48 |
| Pigmentary | ... | ... | ... | ... | 4 |
| Keratosis | ... | ... | ... | ... | 1 |
| Vesicular | ... | ... | ... | ... | 5 |
| Papillomatous | ... | ... | ... | ... | 5 |
| Polymorphous | ... | ... | ... | ... | 146 |
| Nodular | ... | ... | ... | ... | 214 |
| Subcutaneous gummata | ... | ... | ... | ... | 98 |
| In 422 of these cases the mucous membrane was affected:— | | | | | |
| Erythema of the Fauces | ... | ... | ... | ... | 126 |
| Mucous patches of the oral mucous membrane, genitals, or anus, including a few condylomatis | ... | ... | ... | ... | 216 |
| Superficial ulceration of fauces | ... | ... | ... | ... | 70 |
| Deep ulceration | ... | ... | ... | ... | 16 |

The most striking features of these tables are the comparatively small number (about 14 per cent.) of cases of the roseolous type, and the very large number of tertiary syphilides and subcutaneous gummata. With regard to the comparatively small number of cases of roseolous type, the explanation is that though it is roughly estimated that about 90 per cent. of cases of syphilis present this type, yet the absence of subjective symptoms—the mild character of the lesion—and their not infrequent short duration, tend to neglect on the part of the patient, until a more pronounced papular eruption, with its modification (over 33 per cent. in the above table) induces the patient to seek relief.

The most important feature, however, is the large number of late manifestations, including nodular lesion of the ulcerating, destructive type, and subcutaneous gummata, amounting to over 30 per cent. Although nodular lesions may occur early, yet they occur most frequently in the tertiary period, and those included in this table occurred as late manifestations not in any case associated with the commonly recognised secondary cutaneous lesions.

Some few years ago I was induced to make some observations on this point in order to refute an assertion by a well-known medical journal to the effect that tertiary manifestations of syphilis were comparatively rare in Australia.

I tabulated 400 cases of syphilis. Out of these there were 60 cases, or 15 per cent. of tertiary skin manifestations, and in two only of these had continuous treatment been carried out during the secondary stages of the disease.

In many cases, the presence of alcohol in the later period had added to the susceptibility of the tissues induced by the syphilitic virus uncombated by mercury during the earlier periods.

My later observations, however, of 1,000 cases of syphilis of the skin gave double the percentage of later manifestations, *i.e.*, 312, or over 30 per cent. According to figures published by Alfred Fournier, in 1889, tertiary lesions of the skin amount to 1,215 out of 3,429 cases, *i.e.*, about 33 per cent. of all tertiary lesions, those of the mucous membranes, bone viscera, and nervous system making up the rest.

Now, if in a special department, such as the skin, 30 per cent. of the cases presenting themselves are affected with tertiary lesions, one is justified, if attempting to estimate the whole, in assuming a very considerable number of patients with lesions in other tissues which, according to Fournier's figures, quoted above, are, taken together, twice as numerous as skin and subcutaneous lesions. This would bring the percentage up to a very much higher figure than exists in many countries of Europe, where the total sum of tertiary lesions of all organs varies from 6 to 15 per cent.*; a condition of things that should not exist in this country where tissue resistance is less liable to be impaired than in the larger cities of Europe, and in a country where the facilities for continuous treatment in the earlier stages ought not to be any greater.

* The figures referred to are given by Rollet as 15 per cent., in the Antiquaille, at Lyons; Vogda, 6–8 per cent. in the Allg. Krankenhaus, in Vienna; Haslund, 12.4 in Copenhagen.

AN ANALYSIS OF 5,000 CASES OF DISEASES OF THE SKIN OCCURRING IN AUSTRALIA.

A. W. FINCH NOYES, F.R.C.S. Edin.

Surgeon-in-Charge of the Department for Diseases of the Skin, Alfred Hospital. Surgeon to Out-patients, Melbourne Hospital.

The following statistics are taken from 4,000 (four thousand) consecutive cases in my hospital practice at the Melbourne and Alfred Hospitals, both of which are general hospitals, with special departments for diseases of the skin; 1,000 (one thousand) are from my private practice. No cases in either private or hospital practice have been recorded a second time, for careful notes have been taken of every case as it presented itself, whether the affection was a common or a rare one, otherwise a rebellious case, such as one of lupus vulgaris, one of eczema or of psoriasis, presenting itself in different years, might be recorded as two separate cases.

It is generally recognised that statistics such as these do not necessarily give the exact ratio in which the affections of the skin really occur. Rare diseases and rebellious affections are more liable to come under the observation of the dermatologist than are simple ones, which either pass into the hands of the general practitioner, or do not require any special treatment. Others of an ulcerative or neoplastic nature may find their way to the general surgeon, or, if accompanied by marked constitutional disturbance, are more likely to come under the cognisance of the general physician. The same objections, however, exist in other countries as here, hence for comparison many of the objections vanish.

In the following observations, the hospital cases are referred to in comparing the figures with those of other countries, for it is considered that in them there is less liability to disturbance of the true ratio than in the statistics of private cases. In the tabulated record, both private and hospital cases are included, but in separate columns:—

ERYTHEMA MULTIFORME.—Including erythema iris and erythema nodosum, 78 cases have presented themselves in 4,000. This is in excess of the London records nearly two to one, and very much in excess of the Glasgow statistics.

URTICARIA.—My statistics give 131 cases in 4,000, or about 34 in 1,000. This includes 9 cases of urticaria papulosa, the proportion of which is modified by the small number of children attending the Melbourne Hospital for treatment. Two well-marked cases of urticaria pigmentosa are also included.

ECZEMA.—1,272 cases are recorded in 4,000, giving about 31 per cent. The figures take a mid-position between those given in English and those given in American statistics, and are much above those given by Hebra for Vienna. In England, Crocker's statistics give about 26 per cent. In America they vary from 34 to 40 per cent.

Age.—Eczema is recognised as being a common affection in children, but owing to the small number of children attending the Melbourne Hospital, from its proximity to the Children's, my statistics show but 15 cases in 400 analyzed below the age of ten years, the largest proportion, 74, occurring in the fourth decade. The figures 15, 56, 68, 74, 63, 60, 47, 15, 2, represent in order the number of cases occurring in the different decades up to the ninth.

Sex.—Females predominate over males in about the ratio of 5 to 4, the actual number being—Males 177, females 223.

Duration.—Of 400 cases in public practice, 90 had existed for less than one month since the first attack; the others varied from one month to 28 years, with exacerbation from time to time.

Distribution.—In 146, more than one region was affected. Where one locality alone was involved, the parts affected were in the following ratio:—Head 26, face 36, upper extremity 37, lower extremity 84, trunk 13, hands 42, feet 5, nipple 5, genital 6.

Phases.—Of the phases which the condition presented on the first appearance of the patient, the papular was the most common; but frequently more than one phase existed. The ratio was—Erythematous 29, papular 95, vesicular 57, pustular 20, rubrum 14, squamous 69, infiltrative 10, verrucose 5, mixed 101.

DERMATITIS HERPETIFORMIS.—My statistics give 10 cases in 4,000. This is the same number as is recorded by Crocker in 10,000 cases.

PEMPHIGUS.—Five cases are recorded in 4,000. This closely corresponds with McCall Anderson's statistics, and is slightly in excess of the number given in the statistics of the American Dermatological Association. Crocker, for London, Kaposi, for Vienna, and White, give, approximately, 3 per 1,000.

PSORIASIS.—211 hospital cases of psoriasis are recorded, giving about 5 per cent. This is slightly below Crocker's record for London and McCall Anderson's for Glasgow, though if psoriasis, and what is now recognised by many authorities as the psoriasis form of seborrhoic dermatitis, be placed in the same group, this would bring the figures more into line. The statistics of White and those of the American Dermatological Association make the proportion in parts of America about 3 per cent. Hebra gives 1 in 60 as the average in Vienna.

LICHEN RUBER PLANUS.—About 5 per 1,000 (22 in 4,000) is the proportion given by my records. Crocker's statistics give 98 in 10,000, or about 10 per 1,000, from which it would appear that the affection occurs here but half as frequently as it does in London.

DERMATITIS.—Under this heading 54 cases are reported, and include inflammatory processes of the skin set up by ordinary irritants, dyes, lime, and so forth. Many of them—fourteen in number—were traceable to contact with a plant common in many parts of Australia, and known as dogwood. a loosely applied, hence misleading, term, for the same name is given to totally different plants. The one under consideration is the *cassinia aculeata*, contact with which may produce erythematous, vesicular, papular, or pustular lesions, corresponding to some extent with the different phases of eczema, and which may, in fact, develop into a true eczema in patients who have never suffered with a similar skin affection; or it may fan into flame the smouldering embers of a previously existing eczema. (A full account of the condition is given in the *Intercolonial Medical Journal of Australasia*, 20th July, 1899.)

LUPUS VULGARIS.—In order to obviate the error of overestimating the frequency of occurrence of lupus vulgaris, care has been taken, as throughout these statistics, to record new cases only, and not those that have presented themselves with a similar condition at any previous period. Fourteen cases are recorded out of 4,000, giving between 3 and 4 per 1,000. English, Scottish, and European statistics give between 10 and 20 per 1,000. The strong sun's rays, the absence of intense cold, and the more

favorable conditions of life of the lower classes throughout Australia perhaps accounts in some degree for this lower percentage of cases.

LUPUS ERYTHEMATOSUS.—My statistics make it appear of more frequent occurrence than lupus vulgaris in the ratio of 3 to 2 (21 cases out of 4,000). According to the statistics of the American Dermatological Association, it occurred in 43 cases out of 16,863—that is, in about the same ratio as lupus vulgaris; but in all other hospital records to which I have access it is of very much less frequent occurrence than lupus vulgaris. My figures give about 5 per 1,000, those of Crocker about 6 per 1,000.

SYPHILIS.—703 cases of cutaneous manifestations of syphilis were observed amongst 4,000 skin cases. Of these, 212 were either late nodular lesions, or gummatous ulcerations; of the remaining 491 cases of the secondary period, 109 presented characteristically multiform eruptions; of the others, where one type either existed alone, or was distinctly the prominent feature, 127 were macular, 155 papular, 74 papulo-squamous, 21 pustular, 4 vesicular, and 1 pigmentary. In 360 cases, the mucous membrane was also affected, either with erythema, mucous patches, or superficial ulceration. Eighteen extra-genital chancres were observed.

LEPROSY.—One case only has come under my observation in hospital practice, two in private practice. At present there are no lepers in this portion of Australia (Victoria).

SEBORRHOIC DERMATITIS.—Included under this heading are three types of dermatitis—the eczema form, the lichenoid (*lichen circinatus*), and the psoriasiform. With regard to this latter type, sometimes the lesions correspond so closely with those of psoriasis that it is impossible to distinguish one from the other, and there may be very much closer relationship between them than is generally recognised. However, cases are included under this heading, the lesions of which are clinically characterized by the association with seborrhoic processes elsewhere, by the presence of scaling, which is greasy and non-silvery, and by the absence of predilection for the elbows and knees. Of the eczema type, 181 cases are recorded in 4,000, between 4 and 5 per cent. Of the lichenoid type, corresponding to what was known as *lichen circinatus*, 56 cases in 4,000 are recorded, as against 46 in 10,000 of Crocker's cases.

PARASITIC AFFECTIONS.—Amongst the vegetable parasitic affections, conditions produced by the *Achorion Schonleinii*, the *trichophyton fungus*, and the *microsporon furfur* are included.

Many other affections should be included under the heading of parasitic, using the word in its extended sense; but this cannot be done without completely remodelling the classification used here. Of favus, one case only has come under observation, and that in a young Jew, who had spent only a portion of his life in Australia.

Forty-eight cases of *tinea tonsurans*, including *kerion*, have been observed in 4,000 cases, 6 of *tinea barbae*, and 15 of *tinea circinata*. This record differs from that given by Crocker in a very marked degree, for 1,309 cases of *tinea* presented themselves in 10,000, giving an average of 13 per cent. My own figures give less than 2 per cent. *Tinea versicolor* existed in nearly 1 per cent. of cases.

The small number of children attending the Skin Department at the Alfred and Melbourne Hospitals accounts for the comparatively small percentage of cases of *tinea tonsurans*.

Of the animal parasites, scabies existed in about 2 per cent. of cases, whilst Crocker and McCall Anderson give respectively 8 per cent. and 25 per cent. Since these records were made, a very distinct and almost sudden increase of scabies has occurred, bringing the disease up to 4 or 5 per cent.

In conclusion, the most noticeable fact in connexion with these statistics is that no affections of the skin are recorded for this portion of Australia (Victoria), which have not been observed in English clinics. The frequency of occurrence of some affections differs considerably when compared with English figures, but the difference is no greater than is seen between statistics collected in London, and those compiled in Scotland. The types here, so far as my observations are concerned in this part of Australia, have not as yet been modified to any appreciable degree either by climate or other surrounding influences.

The following is a tabular statement of the frequency of occurrence of the different affections of the skin observed in 4,000 consecutive hospital cases, and in 1,000 cases taken from my private practice:—

CLASS 1.—CONGESTIONS.

| Disease. | Hosp. | Priv. | Total. |
|----------|-------|-------|--------|
| Erythema | 6 | 2 | 8 |

CLASS 2.—INFLAMMATIONS.

| | | | |
|--------------------------|-------|-----|-------|
| Erythema exudatum | 51 | 8 | 59 |
| Erythema nodosum | 27 | 1 | 28 |
| Erythema induratum | 2 | — | 2 |
| Peliosis Rheumatica | 1 | 1 | 2 |
| Urticaria | 129 | 29 | 158 |
| Urticaria pigmentosa | 2 | — | 2 |
| Eczema | 1,272 | 300 | 1,572 |
| Impetigo contagiosa | 134 | 4 | 138 |
| Furunculus | 70 | 9 | 79 |
| Carbunculus | 2 | — | 2 |
| Pompholyx | 4 | — | 4 |
| Herpes zoster | 103 | 5 | 108 |
| Herpes facialis | 4 | 1 | 5 |
| Herpes præputialis | — | 2 | 2 |
| Pemphigus | 5 | 1 | 6 |
| Hydroa herpetiforme | 10 | 2 | 12 |
| Hydroa vacciniforme | 1 | 1 | 2 |
| Psoriasis | 211 | 43 | 254 |
| Pityriasis rubra | 1 | 1 | 2 |
| Pityriasis rubra pilaris | 2 | — | 2 |
| Lichen planus | 22 | 12 | 34 |
| Lichen ruber acuminatus | 1 | — | 1 |
| Lichen pilaris | 2 | — | 2 |
| Dermatitis | 54 | 2 | 56 |
| Feigned eruptions | 3 | — | 3 |
| Symmetrical gangrene | 6 | — | 6 |
| Vaccination eruptions | — | 1 | 1 |
| Dermatitis medicamentosa | 13 | 6 | 19 |

CLASS 3.—HÆMORRHAGES.

| | | | |
|---------|----|---|----|
| Purpura | 21 | 1 | 22 |
|---------|----|---|----|

CLASS 4.—HYPERTROPHIES.

| Disease: | Hos. | Priv. | Total. |
|----------------------------------|------|-------|--------|
| Ichthyosis | 19 | 7 | 26 |
| Keratosis pilaris | 12 | 3 | 15 |
| Verruca | 5 | 6 | 11 |
| Clavus | — | 1 | 1 |
| Callositas | 1 | 1 | 2 |
| Tylosis palmar et plantar | 6 | 4 | 10 |
| Scleroderma | 5 | 4 | 9 |
| Elephantiasis | 2 | 1 | 3 |
| Chloasma | 6 | 3 | 9 |
| Nævus pigmentosus | 4 | 5 | 9 |

CLASS 5.—ATROPHIES.

| | | | |
|-----------------------------|----|---|----|
| Leucoderma | 12 | 4 | 16 |
| Atrophoderma senilis | 1 | — | 1 |

CLASS 6.—NEW GROWTHS.

| | | | |
|-----------------------------------|-----|----|-----|
| Molluscum fibrosum | 4 | 2 | 6 |
| Lupus vulgaris | 14 | 6 | 20 |
| Scrofuloderma | 5 | — | 5 |
| Tuberculosis cutis | 5 | 3 | 8 |
| (other types of) | | | |
| Lupus erythematosus | 21 | 14 | 35 |
| Syphilis, secondary | 491 | 21 | 512 |
| Syphilis, tertiary | 212 | 20 | 232 |
| Leprosy | 1 | 2 | 3 |
| Keloid | 4 | 4 | 8 |
| Papilloma | 2 | 1 | 3 |
| Nævus vascularis | 2 | 1 | 3 |
| Telangiectasis | 1 | 4 | 5 |
| Lymphangioma circumscripta | 3 | — | 3 |
| Rodent ulcer | 6 | 3 | 9 |
| Sarcoma cutis | 1 | — | 1 |

CLASS 7.—NEUROSES.

| | | | |
|-----------------|----|----|----|
| Pruritus | 25 | 16 | 41 |
|-----------------|----|----|----|

CLASS 8.—DISEASES OF THE APPENDAGES.

A.—Sweat Glands.

| | | | |
|---------------------|---|---|----|
| Hyperidrosis | 8 | 4 | 12 |
| Bromidrosis | 1 | 3 | 4 |
| Miliaria | 5 | 1 | 6 |

B.—Sebaceous Glands.

| | | | |
|----------------------------------|-----|----|-----|
| Seborrhœa oleosa | 5 | 6 | 11 |
| Seborrhœa sicca | 24 | 28 | 52 |
| Seborrhœic dermatitis | — | — | — |
| (1) <i>Eczema type</i> | 181 | 70 | 251 |
| (2) <i>Psoriasis type</i> | 49 | 16 | 65 |
| (3) <i>Lichenoid type</i> | 57 | 14 | 71 |
| Sebaceous cyst | 5 | 1 | 6 |
| Milium | — | 1 | 1 |
| Comedo | 2 | 1 | 3 |
| Acne vulgaris | 105 | 83 | 188 |
| Acne rosacea | 52 | 43 | 95 |
| Acne varioloformis | 1 | 1 | 2 |
| Adenoma sebaceum | 2 | 2 | 4 |

C.—Hair Follicles.

| Disease. | Hosp. | Priv. | Total. |
|-----------------------------------------|-------|-------|--------|
| Hirsuties | 2 | 6 | 8 |
| Trichorrexia nodosa | — | 3 | 3 |
| Canities | 1 | 3 | 4 |
| Alopecia | 11 | 16 | 27 |
| Alopecia areata | 34 | 26 | 60 |
| Folliculitis | 23 | 8 | 31 |
| Dermatitis papillaris capillitii | — | 1 | 1 |
| Sycosis | 57 | 28 | 85 |

D.—Nails.

| | | | |
|-----------------------|----|----|----|
| All affections | 16 | 10 | 26 |
|-----------------------|----|----|----|

CLASS 9.—PARASITES.

| | | | |
|------------------------------------------|-------|-------|-------|
| Favus | 1 | — | 1 |
| Tinea tonsurans, including kerion | 48 | 39 | 87 |
| Tinea barbæ | 6 | 2 | 8 |
| Tinea circinata | 15 | 3 | 18 |
| Tinea versicolor | 35 | 4 | 39 |
| Scabies | 77 | 5 | 82 |
| Pediculosis corporis | 123 | 2 | 125 |
| Pediculosis capitis | 17 | — | 17 |
| Pediculosis pubis | 8 | 2 | 10 |
| | 4,000 | 1,000 | 5,000 |

THE ACTION OF X-RAYS ON THE SKIN.

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At the Australasian Medical Congress, held in Adelaide in 1905, I had the honour to place before the Congress certain theories which I had formed as to the chemical effects of the X-rays upon the skin. I sought to show that nitric and nitrous ions, coming into contact with the skin, gave rise to the bronzing or pigmentation, which occurs in cases treated with the rays, and that the colour was darkened by the ammonia in the skin. I stated: "This theory, I think, also helps to explain the necrotic changes that take place in the tissues under prolonged application of the X-rays. The nitric ions are carried into the tissues, and set up that destructive condition which is so difficult to heal—a condition simulating a deep burn from nitric acid." During the three years since the last Congress I have given the subject almost continuous consideration, and the whole of my experience and experiments go to confirm and extend the theory then enunciated.

It was not long after Röntgenography came to be used and experimented with that the remarkable effect of the rays on healthy skin was noticed and inquired into. The obvious suggestion was to apply it to pathological tissues, and thus the modern use of X-rays—radio-therapy—commenced. Freund and Schiff are credited as being the first to

systematically use the X-rays as a therapeutic agent. Their earliest cases were those of hypertrichosis and tinea. According to Belot, the first scientific radio-therapist was Kienboch, but, though Belot declares that radio-therapy has passed from the domain of empiricism into that of an exact science, there is still, in my opinion, much room for improvement.

This action of the X-rays upon the skin produces a condition known as dermatitis. It may be divided into two forms—acute dermatitis and chronic dermatitis. The acute form was most common in the early days of the X-rays. The work done was principally radiography, and long exposures were necessary, owing to the defective low vacuum tubes then supplied. Nowadays, since modern high vacuum tubes have reduced the time of exposure to seconds, it is seldom heard of in radiography. In radio-therapy, it may still occur, though the too modern knowledge and skill have come to our aid, and provided us with means for measuring and regulating our doses. But variation in the vacuum of a tube is possible, even while the tube is in use, and, so far, the detection of this is beyond the power of the operator. Individual idiosyncrasy has also to be studied, and my own method is to give a trial application of the rays first to ascertain how the patient is likely to be affected by them. It is only by long exposure to the rays that the acute form of dermatitis is developed. Certain very definite results occur when healthy tissue is submitted to the action of the rays to the stage of re-action. The first feature observed is a slight erythema, with itching. If treatment is stopped, this will be replaced by a decided pigmentation, which lasts for some time. Then the epidermis commences to desquamate. The bronzed skin disappears, leaving a clear, new-looking skin beneath it. While the pigmentation is present, the skin has a dirty, unwashed appearance. The second stage after the erythematous, especially if near a hairy area, is that the hairs become loosened and fall out. When prolonged weak applications of the rays are made, the pigmentation often appears without any inflammatory symptoms. In other cases, when the applications have been prolonged, but stronger, the pigmentation appears before the inflammation, or may be co-incident with it.

In my opinion, the pigmentation is due to the nitric and nitrous ions coming in contact with the skin, and forming xantho-proteic acid. This, with the ammonia present in the skin, forms the brown pigmentation. It differs in no respect from the effect on the skin of the rays of the sun, except that the X-rays are more powerful, and produce their effect with less exposure than is required by the solar rays. Ordinary sunburn may properly be compared to acute X-ray dermatitis. There are the inflammation, the bronzing, and the scaling, from exposure to strong solar rays. There is the pigmentation without inflammation from prolonged exposure to weak solar rays. There is the co-incident pigmentation and inflammation from exposure to rays of medium strength. The only difference is that what the X-rays do in minutes, the solar rays do in hours. The pigmentation from X-rays varies according to the intensity of the rays. In slight cases, the result may be a lentigo, the familiar freckle produced by solar rays, while after repeated applications, the diffuse pigmentation is like the bronzing of the Australian farmer, or any one continually exposed to the sun. There is no doubt that there is a superficial deposit of pigment, and that the process from which it results is the same in the case of both X-rays and solar rays. As with the "sunburn," the effects of the X-rays vary according to the idiosyncrasy of individuals, but the variation is the same whether

the "burning" is the work of the sun or the work of the X-rays. To sum up then, acute radio dermatitis in the inflammation of the X-rays on the skin may be divided into four stages:—

First stage.—Erythematous.

Second stage.—Vesicular.

Third stage.—Destruction of superficial layer.

Fourth stage.—Necrosis of deeper layers and tone.

But there is a worse form of dermatitis due to the action of the X-rays. This is the chronic form which differs entirely from the acute. This condition is invariably found only amongst operators and tube makers, or those who have been continually exposed to the influence of the rays in a mild form. It is in this form that a heavy price has been exacted from the pioneers of X-ray workers, most of whom have sacrificed their hands and lives in advancing our knowledge of radiography and radio-therapy to where it is to-day. The hands are the part almost exclusively affected in this form of X-ray dermatitis. This is due to the fact that the hands are near to the tube in screen work, and also that the early operators were in the habit of using a hand as a radiometer, holding it in front of the screen to test the intensity of the rays. In screen work, the screen was generally held with the fingers on the side nearest the tube, and the thumbs behind the screen. In this way the thumbs of most operators' hands have escaped serious burns, though the rays have made dreadful ravages upon the fingers. Where a hand has been used as a radiometer, the whole of the back of it will generally be found to be affected, though the thumb, from the protection it has received in ordinary screen work, will be less seriously burnt than the backs of the fingers. Here, again, there is a condition similar to that set up by the action of solar rays. There is a form of solar dermatitis which is closely allied to the chronic form of X-ray dermatitis. It is found only in sea-faring men, stockmen, farmers, ploughmen, carters, and those who are daily exposed to the rays of the sun for years. This solar dermatitis begins with freckles, which become larger and larger, until they coalesce, and form a general pigmentation. This takes place only in the hands, forearms, and face—the parts exposed to the continuous action of the solar rays. Then on the skin there appear small corneous patches about the size of the original freckles. These enlarge, and the bronzing of them shows a deeper brown. Eventually they turn into ulcers. The skin all round become dry, cracked, and scaly. The nails become fissured, discoloured, and brittle. This final result is found only in advanced age. It takes years of exposure to the sun—probably at least 30 to 40—to produce the ulcerated condition.

Dr. McKelvey, medical superintendent of the Melbourne Hospital, has very kindly supplied me with the history of a case which he has under observation. It is as follows:—

"W.E., age 53 years, married, lorry-driver, is always exposed to the sun; arms bare during work. Complains of "ulcers on face"; has noticed that his skin burns easily when exposed to the sun, and during winter it cracks. It is always dry. His brother and sister also have "bad skin"; his children also, but in a less degree. One ulcer on side of neck has been present fifteen years, and the one on face eight years. Had a similar but smaller ulcer removed from skin over right malar bone some time ago. On examination, two ulcers, one on left side of neck, and other on the level of right angle of mandible. Edges rolled over and indurated; only skin involved; no glandular enlargement. Below left eye is a small spot

not so large as a threepence, which looks like a small epithelioma. Skin of forehead is thick and "myxedematous"; arms are both studded with dry raised areas of skin of dark brown colour. Skin of hands is dry, thickened, and fissured. Nails are brittle, marked with grooves, and crumpled; also pigmented; thyroid gland is small, but patient has no symptom of "myxedema."

Such is a typical case of what may be called solar dermatitis. It differs in no important respect from a typical case of chronic X-ray dermatitis. The symptoms and the various stages of development, and the final results are the same in both cases. Chronic X-ray dermatitis commences with pigmentation. Later on, hard, warty eminences make their appearance. These are tender when pressure is applied. The skin becomes hard, dry, and loses its elasticity. It becomes altogether devitalized. The nails suffer also, becoming hard and brittle, with longitudinal striations, which readily split and fissure. Some nails become concave and have a cup-like depression in the centre. If fissured in the centre, they have a double concavity—one at each side of the fissure. The warty eminences after a while commence to break down, and to form into ulcers. With the X-rays this condition is brought about gradually, as with the solar rays. It is doubtful if "solar dermatitis" could be set up in a man under 40 years of age. He could not have been exposed enough. X-rays dermatitis, while it appears gradually, is developed in a few years of mild daily exposure. Individual idiosyncrasy counts for a great deal, but it is the same as both the solar and the X-rays. Fair-skinned people, who are easily burnt by the sun, will be most susceptible to the effects of the X-rays, while dark-skinned people are less susceptible. There is one marked difference between the effect of the sun and the effect of the X-rays upon the skin. Both in the acute and chronic forms of X-ray dermatitis, a noticeable feature is the falling out of the hair on the parts affected. Solar rays rather stimulate the growth of hair. The explanation, in my opinion, is found in the presence in solar rays of the ultra violet rays. I have successfully used the ultra violet rays from the Finsen tube as treatment for alopecia, and I believe that the ultra violet rays in the rays of the sun counteract the hair destroying effect of the force which sets up the dermatitis. In the X-rays, the ultra violet rays are kept inside the tube through their inability to pass through glass. Enough has been said to show the similarity in the effects upon the skin of solar and X-rays.

I now propose to demonstrate the similarity in causes.

ETIOLOGY OF X-RAYS DERMATITIS.

Kassabian, in his book, enumerates a number of theories which have been advanced to explain the cause of X-rays dermatitis. I have considered them in the order in which they are given by Kassabian:—

1. Flight of minute platinum atoms. Belot mentions that the presence of metallic particles in the skin has never been demonstrated, while the histological researches of Gilchrist on this point gave absolutely negative results. This theory must be discarded.
2. Ultra Violet Rays.—Ultra violet rays cannot pass through glass. They are generated inside the tube, and consequently must remain there. X-rays contain no ultra violet rays. Therefore, the ultra violet rays can have nothing to do with it.

3. Cathode Rays.—These possibly held because they are due to negatively electrified particles.
4. Rontgen Rays.—This is undoubtedly true, considering that it includes everything.
5. Electrical Induction.—This has indirectly something to do with it. Rolling exposed his hand to a tube whose resistance was so high that no current could be forced through it with the generator used, and no X-rays were given out. Nevertheless the hand was burned, in spite of the fact that no X-rays were produced. This gives indirect proof of my theory that the surrounding air becomes ionised, and that the nitric and nitrous ions are driven by the electrical force into the skin.
6. Ozone Generation in the Skin.—Tesla believes that the burns are due to ozone generated in the skin, and, to a small extent, to nitrous acid. He introduced a screen made of aluminium (which is perfectly pervious to the rays) between the patient and the tube. No burn resulted. In my opinion, this shows that he "earthed" the electrical force which drives in the ions. The same result was attained as is got with a lightning connexion on a spire. The electrical current was arrested by the screen. I do not say that burns can always be avoided in this way. There might be a surcharge of electrical induction. Possibly an aluminium condenser, placed in the same position, would more effectively arrest the discharge.

My theory co-relates the causes of solar and X-rays dermatitis. Nine years ago, in a paper read before the Brisbane Medical Congress, I ventured to suggest the introduction of medicinal agents into the skin by means of an electric current, and set out the results of some experiments I had undertaken with the object of testing the idea. Since then the electrical introduction of chemicals into the skin has become a recognised method of treatment. If chemicals, placed on the skin, become ionised and introduced, why not chemicals in the air? The electric force is there to drive them in—the *vis a tergo* of the X-rays. Tesla's experiment referred to above determines that this force is the responsible agent. It is also the ionising agent. It cannot be argued for an instant that there are X-rays in the rays of the sun. If that were the case, it would be impossible to carry photographic plates about in anything but specially constructed cases impervious to X-rays. But photographic plates are protected by all sorts of substances which X-rays penetrate. Since the same effects are produced by exposure to solar rays, is it not because that same ionising and impregnating force is present in the solar rays? The medium through which both pass is ionised, and the nitrites, or the nitric and nitrous ions are driven into the skin—in the case of the sun with its weak force only in infinitesimal doses—in the case of the X-rays with a tremendous energy behind them in correspondingly larger doses. These ions, having been driven into the skin, meet with H_2O and HNO_3 (nitric acid) is formed. In a previous paper, I suggested that the ions were composed of NO_2 , and that the result when they were driven into the skin was $2\text{NO}_2 + \text{H}_2\text{O} = \text{HNO}_2 + \text{HNO}_3 =$ nitrous and nitric acid. The burn which would be caused by nitric acid is exactly similar to the burn caused by exposure to the X-rays or to solar rays.

In both chronic solar dermatitis and chronic X-rays dermatitis, the effects are cumulative, and make themselves felt only after years of exposure. Ionised gases are good conductors of electric currents, and the

ionisation set up by the discharge of the electric current increases the conductivity of the air around the tube, and this adds to the force of the current which drives in the ions.

Experiments.—To test the truth of my theory, I have conducted a series of experiments upon a guinea pig. These experiments have not lasted long enough to prove conclusive, but as far as they have gone, they corroborate the theory. I have sought to reproduce the effects of X-ray dermatitis by driving nitric ions directly into the skin by the means of an electric current. I first of all by cocaine cataphoresis, anæsthetize the part to be experimented upon. I then attach a pad saturated with nitrate of ammonia to the negative pole of a one to three milliampere current, and place this on the rump of the pig. His fore-paws are resting upon a pad saturated with soda bicarb., and placed upon the positive pole of the battery. The current is then passed through for about ten minutes. My idea was that the nitrate of ammonia would be ionised, the nitric and nitrous ions driven into the skin, and the same result obtained as from continued exposure to the mild effects of an X-rays. After about half-a-dozen applications, the hair began to fall out, and a somewhat bald patch made its appearance. On the bald patch, two small erosions on the skin appeared. These were about the size of a grain of wheat, and red in colour. I then changed the solution to a 1 per cent, solution of nitric acid. The baldness continued, and the two patches became covered with rough, scaly tissue. It seemed to me that with such a weak solution, the experiment would need to be extended over a very long period of time, and after a few applications, I reverted to the nitrate of ammonia.

DISCUSSION ON DR. CLENDINNEN'S PAPER.

DR. CROWLEY (Melbourne).—In regard to chronic cases of X-ray dermatitis, I will tell this meeting about two cases I saw whilst in London. They were the cases of operators at the London Hospital, whose hands were all covered with growths. The doctors advised these men that if they liked to take the risk of having the X-rays thrown on their hands, a cure would be effected. One man exposed his hands to one full day of X-rays, and in a fortnight all the growths were gone, and his hands remained clear for six months.

DR. HERMAN LAWRENCE (Melbourne).—Dr. Crowley has described the giving of good big doses and the keratosis has cleared up. I saw the operator Dr. Crowley mentions, and he showed me his hands. He treated them, I heard, on account of the result of the X-rays on Xeroderma pigmentosa. Generally these cases go on and die of some malignant disease in about nine years.

DR. MATTHEWS (Sydney).—I would like to say that in the case of ordinary burns, where the healing is very difficult, I think a great deal of success is to be obtained by the use of lead. I would suggest the use of lead ointment in the case of X-rays laceration.

DR. ARGYLE (Melbourne).—Dr. Clendinnen's theory is certainly one worthy of very serious consideration, and deserves our earnest consideration. There is one point I notice he did not mention, but which he did in his Adelaide paper. That was to prove the presence of ions of nitric acid

by means of experimenting with phenolphthalein. I tried to repeat Dr. Clendinnen's experiments in that direction, but did not succeed in getting the same results with phenolphthalein. I would like to know if Dr. Clendinnen followed up these experiments. I thought the experiments were very good indeed, and I sincerely hope he will follow them up a good deal further. Regarding the treatment mentioned by Dr. Crowley, it is "like cure like." One is almost tempted to treat with large doses of X-rays. I must say my personal experience of dermatitis has not been very great. I have not succeeded in burning any body except in cases where I have deliberately tried to do so. I found ordinary boracic ointment to be good. I tried ointment containing bismuth, oxide of zinc; but so far I have never had occasion to experiment in this direction.

DR. HERSCHEL HARRIS (Sydney).—Dr. Clendinnen has really proved himself a hero who stuck to his guns to prosecute his researches for the alleviation of the suffering in others. As to the treatment of the disease, a man has to suffer himself before he can offer much suggestion as to the treatment. I never found anything give relief very much more than bismuth, which has been introduced to the Sydney Hospital for treating X-ray dermatitis. I have tried other remedies with more or less pain. What gave me most relief was (when I had cracks or fissures which I used to cover with) a material called Lichtners adhesive, a mixture of gutta-percha and chloroform. That adheres to the parts for days and weeks, and when peeled off the hands are quite healed, which shows that protection from atmosphere and moisture is good. I published my first operation in the *British Medical Journal* some years ago. Although some of these warts tend to clear up without operation, it is my opinion that the sooner the operation is performed the better. I think it is better not to insert any sutures after the operation. I have had as much as a square inch of warty condition removed from the finger, and that condition healed within a month. I think X-ray dermatitis concerns a surgeon more than it does a skin specialist. The latter can do little in alleviating the condition. I think excising the warts is a good plan. If they reach right to the bone, then I think the finger should be amputated. In some cases, where a very large area has to be removed, I think it is quite advisable to try skin grafting.

DR. WETTENHALL (Melbourne).—I corroborate Dr. Crowley with reference to one of the operators at the London Hospital. The back of the hand was quite covered with growths, whilst he had had a small portion excised from the palm of the hand. After the operation there was nothing on the back of the hand except a small spot about an inch and a half in diameter. Although the keratosis remained on the other part of the hand, on this part where the rays were applied it was all clear. Perhaps the only alteration was a little atrophic appearance of the skin. No one would have known that anything had been wrong.

DR. BECKETT (Melbourne).—I was one of the very early workers at X-rays, and both my hands were very bad. However, I gradually got them well. The left hand is completely well, and I never expose it to the X-rays. The right hand I have treated with collodion and salicylic acid applied occasionally, and have very carefully kept it out of the X-rays as much as I can. I think my hand is gradually coming right. I have certainly done very little X-ray work recently. I am inclined to think that many of the remedies applied do more harm than good. I have noticed about chronic dermatitis that it always comes mainly on the fingers more than anywhere else. I have never seen it as far back as on the wrist. I think there must be some reason for that, because when you come to

think of it, the reason we get our hands hurt is because we use our hands for the testing of the tube, to see how it is working. The whole hand up to the wrist is exposed. At least the back of the wrist is exposed, and yet I have never seen anybody's wrist badly hurt. There must be some cause for that. I have utilized that fact in this way when I want to test the tube. Instead of using the fingers and hands, I use the bone of the wrist on both hands, and I have not seen the slightest sign of the keratosis appear at all. In regard to Dr. Clendinnen's very ingenious theory that it is due to ozone and nitric fumes—it must be ingenious, as I have never heard any one else suggest it—it seems to me very singular indeed to attribute it to that. When you remember that we have present an agent, the X-rays themselves, in which we now have the most powerful negative effect on the screen, and the amount of nitro fumes is something infinitesimally small, and the time the thing is exposed to them is also infinitesimally small. If these fumes could have that effect of producing such peculiar action on the skin as chronic dermatitis it is only reasonable to suppose we would meet with it in the man who works in a chemical factory where the fumes are general. I have never heard of such a thing. There are peculiar effects on the skin from acids, but nothing which corresponds with X-rays dermatitis. In regard to the treatment of acute X-rays dermatitis, it is totally different to chronic dermatitis, and I do not think it should be classed in the same category. I have, unfortunately, had experience of both, and have found all ointments worse than useless. I have certainly found, as suggested just now, that the preparation of lead with a weak carbolic solution seemed to give more relief than anything I have used.

THE PRESIDENT.—I have listened with great pleasure to the paper. Dr. Clendinnen's investigations have been original and extremely instructive. He is recognised as one of the pioneers of X-rays in Australia. I think his classification is a very good one. I notice that he mentions in his paper that he recognised some provision had to be made for the idiosyncrasies of people under the rays. I think that is an important point. I have had the X-rays of the first degree turned on a lady for one exposure. She was under the light for five minutes, and got severely burned in the face as if severely sunburned. I put the rays on again on a subsequent occasion, thinking that the previous burning might have been accidental, but the same result happened. I certainly think some people have idiosyncrasies to the rays. In some these burns are not so frequent. I have seen burns of the first and second degree; but I have not so far seen one of the third degree. In one of my patients on whom I used the X-rays, the treatment extended over a year. This patient developed senile changes in the skin. The skin became slightly atrophic, and this became increased, and the skin lost its gloss. I was certainly disturbed about it; but after a time the skin recovered itself to a remarkable degree. Now, at present, you could not detect it in any shape whatever. In regard to Dr. Beckett's remarks to the effect that there is no occasion for this keratosis on the back of the hand. I think it occurs most frequently in those who have the screen work, and who use developers for plates, where their hands are a good deal in the developing fluid. I do not know whether that is the opinion of the members present; but I think it is a certain factor in it. I would ask Dr. Clendinnen whether he has noticed in any of his patients that it is stimulating to the growth of hair on the face. As regards the treatment I find, as Dr. Beckett says, this lead lotion to be the best. It seems more soothing, and the patient was fairly comfortable, and there was practically no trouble whatever. That

is in the superficial burn. In the deep burn I have had no experience. We have an attendant at the Sydney Hospital whose hands are very bad from the same condition. In these chronic forms I find Hebra's ointment the best. It gives more relief than anything else. I thank Dr. Clendinnen for his very instructive and original paper.

DR. CLENDINNEN, in reply, said.—As regards the President's remarks, I would say that I have a patient at the Melbourne Hospital who responds very readily to the X-rays. Something similar to Dr. McMurray's own case. Some of them can hardly stand any exposure at all, and redden up in a few minutes' exposure. As regards stimulating the growth of hair, I have not noticed that; but if it were so, I think it is another case of idiosyncrasy. In regard to the treatment of dermatitis, I did not go into this matter very much, because all sorts of things have been tried, and as regards the lead and chloride of potash, I have tried both the former for first stage of acute, latter for chronic. Each case had to be treated on its merits. In regard to Dr. Argyle's question, I would say that I have carried out those experiments. I used a very delicate alkaline solution of phenolphthalein. First, I have the vessels shielded over with a plate of aluminium, so as to keep the vessel free from any external influence through the discharge of the tubes. Then I had my weak solution of phenolphthalein, and mixed it up. After that the thing became colourless, showing the presence of acid. After that I treated another sample with diphenyl sulphonic acid, which is a very delicate test for nitric acid or nitrates, detecting about one part of nitric acid in three million parts of liquid. I had great trouble in obtaining pure sulphuric acid. Professor Masson came to my assistance and made me some. Most of the commercial sulphuric acid, which is supposed to be pure, had traces of nitric acid in it. I desire to thank Dr. Harris for his very kindly and sympathetic remarks. I may say that from Dr. Harris I have obtained a very great deal of valuable information on the treatment of these cases. When I was suffering, he was the first to recommend the excision of these warts. The one I had on the back of my hand was no doubt aggravated by other treatment. I tried a series of things, and I think I overtreated it. And it is probably far better to have them excised as soon as they appear, and not to irritate them. Dr. Beckett says that they do not appear on the back of the wrist. I do not agree with him. As regards the arms, there is no doubt that the clothes protect them, and that helps to support my theory. In the early days I always covered the patient over with some fabric of some sort; but I have got small spots on my face myself. I do not think that I classified the acute and chronics in the same category. I should like to mention that nitric ions and nitric fumes are not identical.

ROENTGENOGRAPHY IN URINARY SURGERY.

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There is, perhaps, no branch of surgery which has received more assistance from the introduction of the Roentgen rays than that of the urinary tract.

So accurate is this method that one may be justified in saying that an exhaustive examination of the whole urinary tract should be made before any operation upon a case of suspected stone.

A somewhat extensive experience in this class of case, both in hospital and private practice, during the past ten years, is my excuse for writing a paper on this important and very interesting subject.

RENAL CALCULI.

According to Henry Morris, the most common form of renal calculus in the adult is the uric acid; the next most common, the oxalate of lime; but carbonate of lime, phosphate of lime, a mixture of phosphate and the ammonia-magnesian phosphate (the fusible calculus), cystine, xanthine, urate of ammonium, or the mixed urates are occasionally, though rarely, found as the nuclei or chief constituents of renal stones. Alternating calculi of uric acid, oxalate of lime, and phosphates in distinct layers are not uncommon. Renal calculi are formed at all periods of life.

The nucleus in the case of an infant is usually formed of ammonium urate; that in a person of about fifteen or sixteen years of age consists of uric acid, whilst after the fortieth year oxalate of lime constitutes the nucleus.

Renal calculi differ in size as well as in shape and colour. Their size may vary from that of a hemp seed to that of a small walnut or some times much larger. The large branched phosphatic calculi have been known to weigh as much as 1,500 grains, and in one instance a calculus weighed 5 lbs.

They are usually rounded or oval, unless moulded to the pelvis or calices, when they may be irregular or branched and coral-like.

The surface is usually rough and mammillated.

The colour differs with the constitution of the calculus, and may vary in different layers.

It is mostly purplish-brown in oxalate of lime, reddish-yellow in uric acid, and greyish-white in phosphatic calculi; exceptional specimens being yellow, pink, green, or blue.

The liability of the kidney to calculus, according to Sir Henry Thompson, is equal on the two sides, and in about 15 per cent. of the cases both organs are said to be affected at once.

PATHOLOGY OF RENAL CALCULI.

Of the many possible factors discussed, such as heredity, water, food, gout, rheumatism, diseases, and injury to the spine, the most important cause is probably infection as in the case of gall-stones, and the principal offending organisms are most likely the B.C.C., Eberth's bacillus, gonococcus and staphylococcus.

VESICAL CALCULI.

It is an interesting fact that many animals habitually pass the renal excretion in the form of "stone," for example the serpent tribe varieties, whose renal excretion is almost solid pass uric acid. Birds also pass their urine salts undissolved, and consequently require no urinary bladder.

Man and the higher animals excrete them as a rule in solution; nevertheless these salts are sometimes deposited in a solid form, usually as small crystalline particles, and then the term "sand" is commonly employed to denote them. Sometimes they issue in the shape of little hard bodies of the size of a hemp seed or pea, when they are spoken of as "gravel" or "concretions," and when they are much too large to pass per urethram the term "stone" is applied.

Probably the majority of vesical calculi are of renal origin, but some are formed independently. A large amount of earthy phosphate has its origin in the secretion of the bladder itself, associated with other elements, chiefly ammonia, evolved from the healthy urine therein. Thus stones of all sizes, as well as sand, gravel, or concretions are produced solely in the bladder. Lastly, a vesical calculus may be composed of different deposits, so that a renal calculus, however small, arriving at the bladder, may enlarge there by accretion of phosphates.

URETERIC CALCULI.

These vary in size from a hemp seed to a large olive or sometimes much larger. They are usually oval in shape, and as they always descend from the kidney, their constitution is the same as that of renal calculi.

PENETRABILITY OF CALCULI.

The density of shadow cast by the various calculi follows this order:—
(1) Oxalate of calcium, (2) phosphatic, (3) uric acid.

Whilst the oxalate calculi cast a very dense shadow, the uric acid calculi may be almost imperceptible.

This is readily explained when we consider that the absorptive power of a body varies as the atomic weight, for uric acid is a compound containing only carbon, hydrogen, and oxygen, whose atomic weights respectively are 12, 1, and 16; whilst oxalate of calcium, which is composed mainly of calcium, has an atomic weight of 40.

RECURRENCE OF RENAL CALCULI.

Under certain conditions this may occur:—

(1.) *Infection*.—If infection of the renal pelvis should persist or develop after an operation, or if there be an ulcerative pyelitis, or incrustation of the mucous lining of the pelvis or calices, then it is very likely that calcareous material will be deposited.

(2) *Failure to remove all Stones or Fragments*.—In the removal of the large coral calculi, occasionally loose and brittle fragments are left behind. These fragments may escape into dilated calices, and becoming covered with blood clot may remain undetected.

When handling crumbly calculi, it is often impossible to remove every particle.

Again, when there are numerous calculi pocketed in the different dilated loculi of the calices, one may readily overlook many particles.

In all such cases these fragments or particles may remain, and serve as nuclei of other calculi, which will later demand removal.

Occasionally a fragment becoming displaced during an operation may pass into the ureter, and passing downwards produce an attack of ureteric colic after the operation.

(3.) Other foreign bodies, such as blood clots, pieces of suture, filaments of gauze or cotton unintentionally left serve as points for the precipitation of salts and the formation of calculi.

A drainage tube also favours calcareous deposit in the case of the kidney, the same as in the case of the bladder.

Nephrostomy and the permanent drain of a kidney by a catheter have also been known to favour the formation of calculi.

(4.) Finally, even after a most thorough operation for removal and post-operative antilithic treatment, the factors giving rise to the primary calculus may still persist, and so result in the formation of a recurrent calculus.

Fortunately, however, the majority of patients operated upon for calculi do not require a secondary operation for retained or recurrent calculi, and with a view to avoid this all surgical measures should be as complete and thorough as possible, no foreign bodies should be left along the course of the urinary stream, and when there is no infection, drainage should be dispensed with or used for as short a time as is consistent with the needs of the particular case. In an able article on this subject, published by Wayne Babcock, in the *Annals of Surgery*, he concludes that the reformation of calculi is to be expected in cases in which the kidney has contained many stones, in those in which there is a well marked pyelitis, a dilated or imperfectly draining renal pelvis or ureter, large fragile calculi embedded in the renal substance; or renal or ureteral fistulæ.

TECHNIQUE.

Preparation of the Patient.

If possible, the patient should be prepared as carefully as he would be preparatory to taking an anæsthetic. The bowels should be very thoroughly emptied, and very little food should be taken for some time before the exposure.

This obviates fæcal shadows being cast on the plates. Another reason is that, when empty, the colon is as a rule filled with gas.

By this means greater definition of the underlying structures is obtained and often in such cases a clear outline of the kidney appears distinctly on the plate.

Again, too, the patient might have been taking a mixture containing bismuth, or some insoluble tablets or pills, all of which cast definite shadows.

POSITION OF PATIENT.

As my method is always to work with the tube above, the patient is placed on the back on a firm wooden couch, the head resting comfortably upon one or two cushions, and underneath the knees is placed another large cushion. This latter cushion, besides affording great comfort, tends to lessen the lumbar curvature.

A drawing board, measuring 22 inches by 17 inches, is provided with one side covered with a sheet of thick lead.

This is placed directly beneath the part of the body to be examined, and on it rests the plate in its light tight envelopes. The object of this is to eliminate the "S" or secondary rays, which arise behind the plate as a rule, and the definition thereby obtained is greatly improved.

The compressor employed is in the form of an abdominal binder, made of strong holland, with webbing straps on one side, and buckles on the other.

This binder passing underneath the drawing board is drawn across the patient, and may be tightened to any degree. It acts in a very satisfactory manner, producing slight, if any, discomfort to the patient, and by its means the quality of the resulting negative is much clearer.

The Tube.

This is placed in position in the lead-glass shield of Dean's Universal Stand, which, by the way, is the most perfect stand procurable. The speculum required for the purpose is inserted on the outer side of the diaphragm, and by the simplest manipulation the tube is brought into position.

The diaphragm and speculum, of course, cut off the secondary rays from the tube, and utilize the more parallel ones. The diameter of the speculum employed should be as small as is consistent with the area it is desired to embrace.

Taking both kidneys on the one plate, a four-inch speculum is used whilst if only one kidney is taken a three or two-inch speculum will suffice.

The distance of the tube from the body should never be less than eight inches.

Position of Tube.

When taking both kidneys on one plate, the tube should be directly over the spine and midway between xiphisternum and umbilicus.

When taking one kidney, it should be directly over that kidney.

When the ureters are required, two skiagrams are taken on plates 12 inches by 10 inches. The first one is similarly placed as though both kidneys were being taken; whilst the second corresponds to the procedure adopted in examining the bladder. The tube in this latter case is centred over a point in a line from the umbilicus to the symphysis, but much nearer the latter.

Position of Plate.

As a rule 12 x 10 inch plates are employed generally, though I admit smaller ones might answer as well when only taking one kidney. For the kidneys the upper edge of the plate should be on a level with the tenth rib, whilst in the case of the bladder the lower edge should be seen and felt in the perineal region on drawing the legs apart. Whilst often regretting having used a small plate, I have never regretted the use of a large one. Lumière plates are always employed for my urinary work.

As to the tube itself, I always employ a Müller heavy anodal tube of the largest pattern, 13a. This, I think, is the best tube procurable. With a 10-inch coil working from a 100 volt main, with a mercury jet brake, 9-11 ampères passing through the coil, and the tube registering about 6 Bénédict, the exposure is made, the duration of which varies from 2-12 minutes, according to the thickness of the subject.

Occasionally in very stout subjects I employ an accelerating screen, but whereas formerly I employed it in most cases, for the past three years I have not used it probably more than four or five times altogether. Its service may generally be dispensed with.

Whilst on the subject of tubes, you will pardon me if I mention that Leonard, of Philadelphia, and myself were the first to employ soft tubes for renal roentgenography, and our communications reached England about the same time in 1901. Though even at present some workers prefer a hard tube and an electrolytic brake, the majority employ a soft tube.

I cannot see any necessity for taking snapshot roentgenograms, besides, too, they do not admit of sufficient margin for over or undue exposure.

We all, I think, look forward to a great improvement in tubes during the next few years, for herein lies our greatest difficulty. It is almost impossible even with self-regulating tubes to keep the vacuum at 6 Bénédict

for more than a couple of minutes, as with a high ampèreage the tendency is for the vacuum to become lower after a time. A dodge may sometimes be practised when using the Universal Tube Stand. If, when only half-way through an exposure, the anode should get red hot, a second tube of the same size as the first may be substituted and the exposure continued. This I have done on several occasions, though it is not to be generally recommended. Think of the joy when roentgenographers may work with a tube free from therapeutic and secondary rays, and with a vacuum that will remain constant!

The Negative.

Leonard's axiom must always be borne in mind, viz., "to be able to differentiate between tissues less dense than the least dense calculus."

In a negative showing such definition, it is almost impossible to make a mistake in diagnosis. Needless to say, the negative must always be examined; the print is valueless.

Then again, some medical men are not content unless they are shown a strong negative with striking contrast. They must be given to understand that this is not always essential, for often a weak negative will convey a fund of information, especially when dealing with uric acid calculi. Frequently the outline of the kidney is seen, though not always. When this is clearly seen, the diagnosis is always definite.

The well-known landmarks to always get are the last two ribs, the crest of ilium, spine and transverse processes, and outline of psoas muscle. The development of the plate has a great deal to do with the result. In most of my cases the developer employed is Glycin. The formula is:—

| | | | |
|--------------|-----|-----|------------|
| Glycin | ... | ... | 3x |
| Pot. Carb. | ... | ... | |
| Sodii Sulph. | ... | ... | 3l (6½oz.) |
| Aq. Dest. | ... | ... | 5 xxviii |

Other good developers are:—

| | | | |
|----------------------|-----|-----|----------|
| Edinol | ... | ... | 1 part |
| Pot. Meta-bisulphite | ... | ... | 1 part |
| Pot. Carb. | ... | ... | 7 parts |
| Aq. Dest. | ... | ... | 16 parts |

and

| | | |
|----------------------|-----|------------|
| (1.) Hydroquinone | ... | 150 grains |
| Pot. Bromide | ... | 20 grains |
| Pot. Meta-bisulphite | ... | 10 grains |
| Aq. Dest. | ... | Ad Or |
| (2.) Caustic Soda | ... | 100 grains |
| Sodii Sulphite... | ... | 2 ounces |
| Aq. Dest. | ... | ... |

For use, equal parts of Nos. 1 and 2.

The points most worthy of notice, if good technique be aimed at, are that the developing agent must be capable of yielding good density, and ample half tone, and "shadow detail," i.e., detail in the least exposed parts; it must work sufficiently cleanly to admit of its use in a concentrated form, and it must be usable without bromide, so that none of the effects of exposure are lost.

(T. T. Baker, Journal of Roentgen Society.)

The Screen Examination.

Some men still insist that a screen examination will definitely settle the diagnosis in most, if not all, cases. In some positive cases it may be so, but in negative cases I think it impossible to rely solely upon the screen.

Personally, I seldom employ the screen, relying solely upon the plate.

Mention might be made of the aluminium cryptoscope devised by A. D. Reid. It is an aluminium cup $3\frac{1}{2}$ inches in diameter, with the screen enclosed, and the whole apparatus may be sterilized. When the kidney has been delivered in the loin, it may be thoroughly examined by this means, the contained calculi located before removal, and finally the kidney may be examined to see that no fragments or minute calculi are left behind.

Interpretation of the various Shadows seen on the Negative.

This is a very important point, and one in which the personal equation plays a leading part. First of all, let us consider the kidneys.

The shadows may be high up or low down; in some cases above the twelfth rib, and sometimes as low as the crest of the ilium. I have known a kidney to be drawn down into this latter position simply by the weight of the contained calculus.

The roentgenographer should be able to state where the suspected calculus is likely to be found, and so prepare the surgeon for his task.

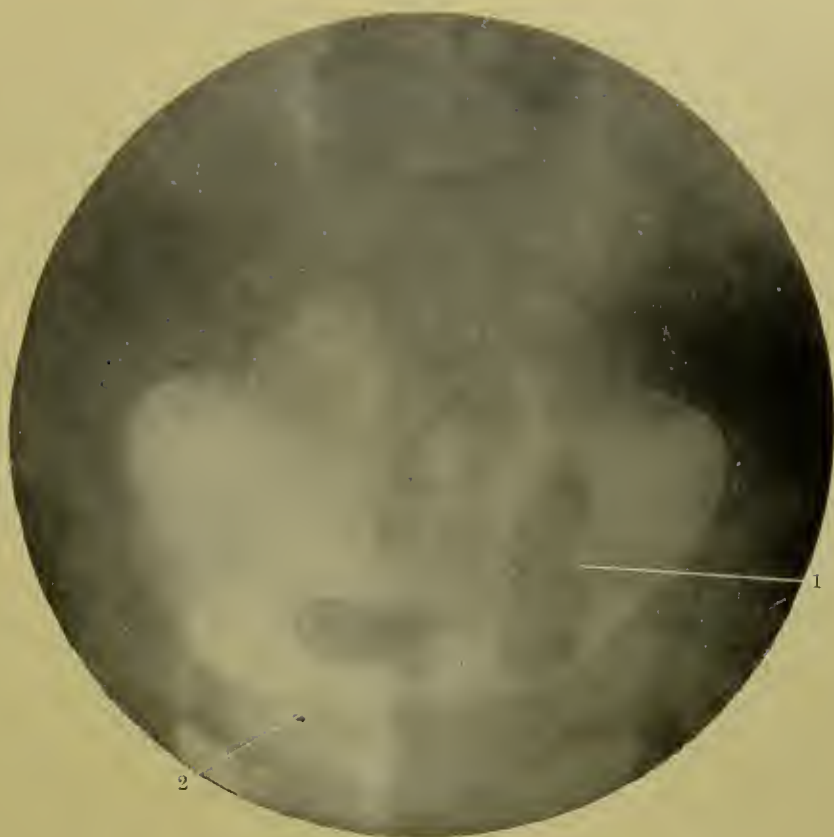
If it can be arranged, the roentgenographer should be present at the operation, as here he may prove of inestimable assistance. I have the good fortune of being present at practically every case, either as assistant, anæsthetist, or onlooker, and on several occasions have insisted upon a calculus being in a certain position, which was subsequently found just when the search was about to be given up. I only mention this to emphasize the necessity of the roentgenographer being present, if possible.

It sometimes happens that a roentgenographer finds a calculus, and the surgeon fails to find it. Whose fault is this? Certainly not always the roentgenographer's. The surgeons must sometimes blame themselves, and several leading surgeons have admitted to me that occasionally it must happen that they overlook a calculus. This is not to be wondered at, considering the various forms of calculi we have to deal with. Palpation is very deceptive when dealing with small calculi, and even when a kidney is bisected every calculus may not be disclosed, as some are embedded in the renal substance. Therefore, when the roentgenographer finds a calculus, and the surgeon fails to deliver it, before the surgeon blames the roentgenographer, another roentgenogram should be taken.

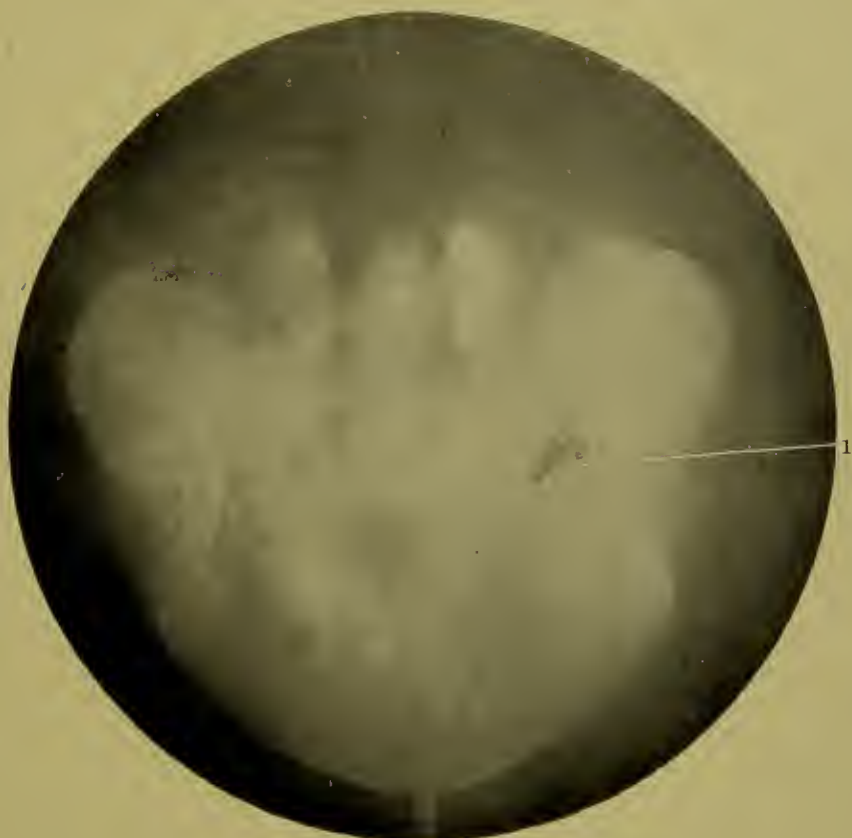
I have known of small calculi being pushed into the ureter during the operation, to be subsequently passed by the patient. At any rate the roentgenographer should be able to tell the surgeon that the calculus is in the pelvis of the kidney, or in a calyx or the kidney substance, or near the upper or lower pole of the kidney, as the case may be, and also state the position of the kidney itself.

The Ureters.

The ureter is from 16-18 inches in length, and longer in the female than the male. Its course is obliquely downwards and inwards, resting upon the psoas muscle in the upper part of its course. It crosses the sacro-iliac articulation and proceeds towards the base of the bladder, gradually approaching the coccyx in its course. After piercing the

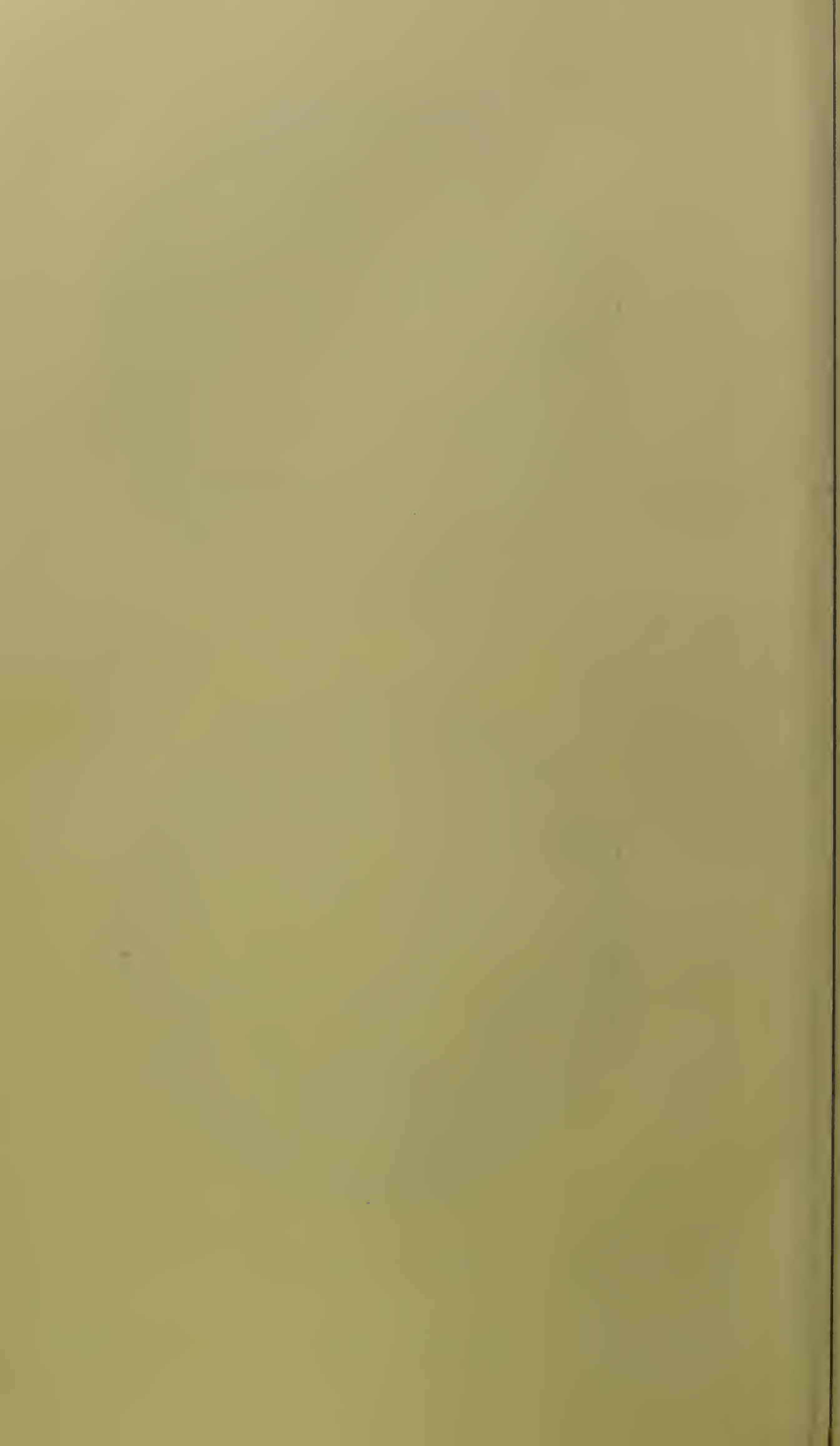


1 Calculi impacted in lower end of right ureter. 2. Vesical calculi.
(Removed by author.)



1. Calculus impacted in lower end of right ureter.
(Removed by Dr Fiaschi.)

DR. HERSCHEL HARRIS' PAPER.



bladder obliquely, the ureteric orifice is situated about $1\frac{1}{2}$ inches from its fellow of the opposite side.

Ureteric calculi are usually situated in one of three places, depending on the physiological narrowing of the ureter.

The first point of narrowing is about 7 centimetres down, and has a diameter of 3.2 millimetres. The second is just near the brim of the pelvis, and has a diameter of 4 millimetres, and the third is at a point just above the bladder, and has a diameter of 2.5 millimetres.

Strange to relate no one has taken the trouble to publish a good map showing the normal relations of the kidneys and ureters. Many years ago I roughly outlined the kidneys and ureters with copper wire in the dead subject, and then roentgenographed same. This I find very useful on many occasions. A copy of this was exhibited at the Hobart Congress.

Hurry Fenwick says that the three great features of ureteric calculi are "that they are in the line of the ureter, their outlines are sharp, and their shapes are more or less oval."

In cases of ureteric calculi, if an operation be performed, it should be done within 48 hours of the roentgenogram, otherwise the calculus may have altered its position.

Some time ago I mentioned in a paper on calculi that probably 4 per cent. were ureteric. I then did not make a rule of roentgenizing the whole urinary tract, as I have done during the past year or so. It is quite a common occurrence now for me to find a small calculus or concretion in the ureter, usually at the lower end, so that I now retract from my former statement, and admit that ureteric calculi are much more common than are supposed, and I also think that many cases of urinary colic are due to a small concretion passing down the ureter, some times blocking for a longer or shorter time the ureter, though generally eventually passing onwards into the bladder, usually to be expelled per urethram.

Vesical Calculi.

As a rule, there are not many difficulties in detecting vesical calculi.

I take my cases lying on the back, always taking care that the bladder has been previously emptied, as without this precaution the shadow cast by the urine would tend to blur the definition of any urinary shadows.

Some authorities advise inflating the bladder with oxygen as a preliminary. The results in such cases are certainly very good, but then again how many patents will submit to this procedure? Many cases, too, we must remember, are roentgenized in this region to prevent the necessity of instrumentation. Such cases are very suitable for roentgenography, and often in a case of enlarged prostate have I been able to detect one or more calculi in the post-prostatic pouch.

In cases treated by litholapaxy, the rays are invaluable.

Differentiation of Shadows.

This is most important and forms one of the greatest difficulties in dealing with urinary calculi. An expert roentgenographer should be able to interpret all the shadows appearing on a plate. Always remember that fæces cast a shadow, and that empty, and distended intestines offer the best prospects of obtaining good results.

A caseous kidney may cast a shadow as dense as a calculus. This I have seen proved by operation. Also there may be a small area of rib calcified.

Calcified mesenteric glands may appear in any part of the urinary tract in various shapes and sizes. Also calcified appendices epiploicæ may be present or tubercular nodules in the epididymis or seminal vesicles that have become partly calcified. Appendoliths also show in some cases.

Fenwick's shadowgraph bougie has been designed with the object of eliminating sources of error in dealing with ureteric calculi, but this is not infallible.

First of all, not many patients will submit to having this ureteric bougie passed, then again there are certain risks in passing it, and lastly it needs very great experience to be able to catheterize the ureters properly.

Several cases have been reported where, even when the bougie was passed, and the shadow corresponded with the ureteric line, subsequent operation proved a calcareous gland adherent to the ureter.

Dr. C. A. Ball has only recently, in the April number of the *British Medical Journal*, published such a case when all these precautions were taken, and nothing was discovered at the operation. Subsequently another roentgenogram was taken, and the same shadow was present—evidently a calcified gland near or surrounding the ureter. The so-called "pelvic-blotch" is always most troublesome to interpret.

It is usually due to phleboliths in the pelvic veins or calcareous deposits on their valves, or calcified patches in arteries.

Last year I published two such cases in the *British Medical Journal*. These shadows are usually the size of a shot, and can only be distinguished from ureteric calculi from the fact that they lie beyond the line of the ureter. In my first case, the two shotty bodies lay apparently in the line of the ureter and one above the other.

Often these "blotches" lie side by side, and there may be several in the one roentgenogram. This fact is against the shadows being ureteric. A difficulty presents itself when a small ureteric calculus is at the lower end of the ureter or has passed on into the bladder.

If the calculus has passed, the shadow of the calculus is usually found in some part of the bladder region away from the original seat of pain. This is natural as, say, in a case of right-sided renal colic when the calculus has passed, it naturally rolls into the bladder, and only by the merest coincidence would it be found just near the right ureteric orifice.

Certain "blotches" occasionally are seen in pelvic skiagrams near the spine of the ischium.

So far nobody has been able to offer any definite explanation as to what they are, although they have been mentioned by several men as probably being due to calcified pelvic ligaments. Their position is usually anterior to the spine of the ischium, being sometimes unilateral and occasionally bilateral. They are probably due to calcareous deposits in the vesiculæ seminales. Lastly, remember that warts if in contact with the plate will cast a shadow.

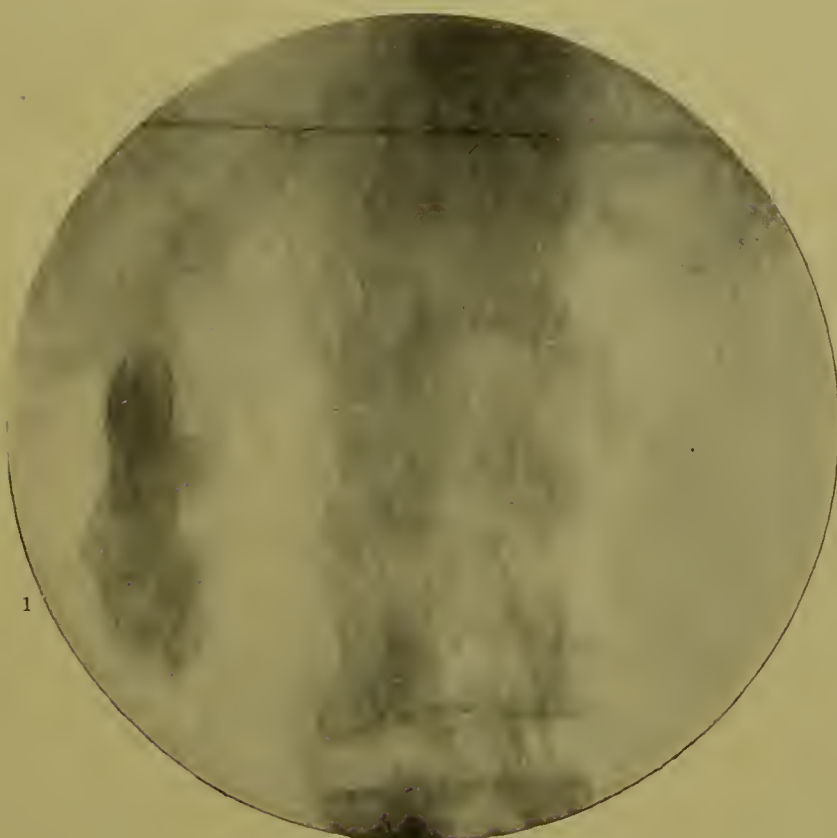
I nearly gave a positive diagnosis in one case, and fortunately just in time accidentally discovered that the patient had a wart on his back, just below his last rib. It must be remembered that the accuracy of the roentgen method depends upon the skill and experience of the operator making the examination, and the interpretation of the plate, the efficiency of the apparatus at hand, and the technique employed.

The Necessity of Roentgenographing the whole Urinary Tract in Cases of Suspected Calculus.

Too much stress cannot be placed on this statement. Every case should have both kidneys, both ureters and the bladder roentgenographed



1. Large right ureteral calculus impacted near brim of pelvis.
(Removed by Dr. Foreman.)



1. Left renal calculus.
(Removed by Dr. W. Chisholm.)

DR. HERSCHEL HARRIS' PAPER.



as a matter of routine. The process is both tedious and expensive, nevertheless the examination is only partially carried out if this be not done.

On a couple of occasions I have missed ureteric calculi by only roentgenographing the renal regions and *vice versa*.

Often, too, we know that calculi in the bladder have descended from one kidney, and probably there are more calculi present in that kidney. .

There may be calculi in both kidneys, and only symptoms on one side; or, again, there may be calculi on one side and referred pain on the opposite side.

Hurry Fenwick well expresses the value of urinary roentgenography when he says:—

“ Before the routine employment of expert roentgenography in cases of renal pain, the diagnosis of stone in the kidney and ureter was merely speculative. The clinician was rarely certain as to whether a stone was present or not, or if he was assured in his own mind that a calculus did exist, he could not say whether it was imprisoned in the kidney or whether it had passed into and become arrested in the ureter, so similar are the symptoms of stone in either position. The surgeon was forced, therefore, to explore first the kidney, and then the ureter, before he could declare the patient free from stone.”

At the same time we must always bear in mind, and if asked, advise that exploration of the kidney ought to be undertaken on the value of the symptoms in spite of a negative roentgenogram.

As Henry Morris points out, there are conditions which give rise to the same symptoms as calculi, which are remediable by operation.

Finally, let me repeat that in every case of suspected calculus submitted to a roentgen examination, the whole urinary tract should be roentgenographed.

ROENTGENOGRAPHY IN DISEASES OF BONE.

I. L. HERSCHEL HARRIS, M.B., CH.M.,

Hon. Assistant Surgeon, Sydney Hospital; Hon. Skiagrapher, Sydney Hospital; Hon. Skiagrapher, Royal Alexandra Hospital for Children, &c., &c.

Quite recently, on looking over some of the numerous roentgenograms taken by me during the past ten years, I was struck by the large variety of bone cases in the collection. This decided me to write a short paper on the subject, including practically every disease of bone, illustrating each variety with one or more roentgenograms.

To be able to interpret these conditions correctly, it is necessary that the interpreter should possess an accurate knowledge of pathology, and you will pardon me if my paper appears more pathological than roentgenographical; but my plea is that in this case the two studies go hand in hand, and the knowledge of the one will assist in the correct interpretation of the other.

Osteomyelitis.—An acute suppuration of the bone, and always is due to the infection of the bone-marrow by pyogenic micro-organisms.

It nearly always begins in the diaphysis of the long bones, usually near the epiphyseal line in contradistinction to tuberculosis, which practically always begins in the epiphysis.

The femur and tibia are the bones most frequently attacked. This condition in its early stages does not call for the assistance of the Roentgen rays, but later on these are useful in searching for any "sequestrum."

This latter is distinguished from the "involucrum" by being less dense as a result of necrotic changes, and frequently a good roentgenogram will reveal in a most marked manner the whole extent of the "sequestrum."

Subsequently, when new bone is being deposited, the Roentgen rays are very useful in showing the extent of this new formation.

Rickets.—An acquired disease of children, due partly to faulty feeding, and mainly to confinement, with consequent lack of exercise. The changes in rickets are brought about by an irregularity of ossification, chiefly in the long bones, the changes being confined largely to the epiphyseal line at the junction of epiphysis and diaphysis. As a result of these abnormalities, deformities of all the bones of the body are brought about, resulting in changes in the shape of the head, in enlargement and shortening, and bending of the long and other bones.

These changes are often beautifully depicted in roentgenograms.

Chondromata.—These are fairly common tumours of bone, they may appear externally to the cortex, or may grow in the medullary canal.

They may arise directly from the marrow, probably from remnants of the provisional cartilage cells.

They also appear frequently to arise from remnants of the epiphyseal line. They are most common upon the hands, and also occur frequently near the ends of bones.

Those which occur inside the cortex in some cases enlarge sufficiently to cause perforation of the cortex. They usually form nodular masses, oftentimes of large size; in most cases these are multiple tumours. Sometimes heredity plays a part in these tumours. The chondromata are especially liable to undergo various forms of degeneration, such as myxomatous degeneration, or portions of the tumour may become calcified, and in some cases portions are ossified and converted into true bone.

Macromelia is the name given to the monstrous growth of a part. It is a congenital condition, and is thought to be due to obstruction of lymph channels. It is essentially dependent upon a vice of development. Affecting the fingers it is called macrodactylia, and the foot macropodia.

Congenital Defects of Bones.—We are all well aware that in human beings bones are preformed in cartilage in the embryo, and later, by a process of ossification these cartilaginous provisional tissues are converted into true bone.

Various congenital deformities of the limbs occur in man because of the interference in various ways with the proper and normal formation of these cartilaginous masses. If for any reason these cartilaginous masses fail to be preformed in the embryonic tissues, naturally no ossification can occur, and there may be a partial or complete lack of development of the corresponding bone.

The amount of this congenital absence may vary from the absence of an entire hand to the absence of one or several digits, or of one or more phalanges. Congenital absence of the radius is an example of this deformity seen in three cases by the author.

If, on the other hand, there is a deposit of an unusual number of cartilaginous masses, representing a reversion to the condition present in some of the lower animals, *i.e.*, if too many rays are laid down in cartilage, it is possible for extra bones to be formed. This condition may lead to the formation of extra hands, fingers, phalanges, limbs.

The most common form of this deformity is the appearance of an extra digit, which usually appears in the form of an extra or bifid thumb.

In many of these cases there is webbing between adjacent digits. The condition in each case can be decided by Roentgen examination.

Acromegaly.—An acquired disease, characterized by peculiar changes in the bony system dependent upon disease of the pituitary body.

The beginning of this disease is not noted, and only after marked bony changes have occurred is attention called to it.

The bony lesions generally are symmetrical, the bones are thickened and rough with small exostoses, similar to the exostoses for the attachment of tendons. The hands and feet are usually extremely large, and the Roentgen rays will easily reveal the diagnostic points.

Osteomata.—These are bony tumours which generally arise by growth of the periosteum and form solid bony masses external to the cortex of the bone, when they are called "exostoses." Rarely they arise from the inside of the bone, and then are called "enostoses."

Some are hard and ivory-like, whilst others are more cancellous. They may be congenital or appear late in life, and may be single or multiple.

There is generally very little difficulty in diagnosing these tumours in the ordinary way; but as they tend to recur if not thoroughly removed, a roentgenogram is often very useful.

Gout and Rheumatism.—Gout, as is well known, is characterized by the deposit of the salts of uric acid in the tissues of the joint. This deposit takes place primarily in the ligaments; but later the articular cartilages are also affected.

In marked cases considerable accumulation of the combined urates of sodium, potassium, magnesium, and calcium takes place in the neighbourhood of the joints. The first three salts are only slightly opaque to the rays, but the calcium salts are more dense.

As the urates do not exist in a pure form in the tissues, but in combination, it is found practically that in a roentgenogram of a case of gout the accumulation of urates throws a shadow of considerable density on the plate.

In viewing the roentgenogram of the gouty hand in this collection there can be seen distinct additions to the outline of the phalanges.

Now rheumatoid arthritis is characterized, as in gout, by swelling of the joints of the hands and feet; later, all the joints of the body may be attacked.

In early cases in which the trouble is just commencing, there is often considerable trouble in differentiating this disease from gout.

In the marked case of rheumatoid arthritis in the collection, well marked ulnar deflection of the fingers is seen, together with subluxation of the joints. The bones of the carpus and meta carpus are also considerably altered.

Frequently the heads of the phalangeal and metacarpal bones are seen to be destroyed, and eroded to an extraordinary extent.

The bones of the carpus are indistinct, and present a mushed-up appearance.

In early cases of rheumatoid arthritis the bones are normal in appearance. There may be a suggestion of translucency, with a loss of definition, in the bones of the carpus, but there is never any deposit about the phalanges, as seen in gout.

The appearance of any necrotic areas as above described, with the absence of additions to the outlines of the bones, at once suggests rheumatoid arthritis.

All these points have been referred to in an admirable paper by Dr. Ironside Bruce, published in the journal of *Medical Electrolgy and Radiology*.

Syphilis.—The lesions produced in bones by syphilitic infection may be congenital or acquired, and, as in other syphilitic lesions, the manifestations may be protean.

In most children with congenital syphilis, there is seen an irregularity of the epiphyseal line, resulting in its becoming toothed instead of assuming a straight line across the bone at right angles to the long axis of the shaft. This irregularity is due to abnormal transformation of the cartilage into bone, as a result of which not all the cartilage is changed into bone at the same time, but irregular lines of cartilage extend into the diaphysis. There are other changes to be seen in the bones as the result of syphilitic infection.

The most common lesion is one which affects the periosteum, and leads to the new formation of periosteal bone. It may occur in congenital or acquired syphilis. It may affect one or many bones. In some cases it affects the shaft, in others the epiphysis. Sometimes there is such an enormous thickening of the epiphysis of the bones, together with secondary joint changes as to suggest fracture or dislocation. In other cases the thickening affects only the shafts of the long bones, generally of the arm or leg, although no bones are exempt.

In other cases also, both in the congenital and acquired forms, there may be marked proliferation of the endosteum of the bone, with or without thickening of the periosteum, although the latter is usually present. This process as a rule affects the bone in its entirety, and most commonly the tibia.

As a result of these changes, the bones are enlarged and thickened, and in some cases from endosteal thickening the marrow canal is very largely or entirely obliterated.

Sometimes true gummata form, which may appear in the spongy portion affecting the shaft or the epiphysis. Should they occur near one of the large joints, secondary changes in these joints are likely to occur, and may produce a condition which clinically cannot be distinguished from tuberculosis of the joint or chronic arthritis.

In other cases the gummata are formed in the lower layers of the periosteum, and lead to circumscribed nodular thickenings on the surface of the bone.

It must be remembered that in children gummata may affect the marrow of the phalanges, and the entire marrow may become destroyed, and necrotic, followed by proliferation of the periosteum, which forms a new layer of cortical bone. As a result of this periosteal activity the shaft of the phalanx increases in size, and assumes a peculiar flask shape, similar to that seen in tuberculosis.

Gummata appear in roentgenograms as light areas in the midst of dark surroundings.

Tuberculosis of Bone.—Tubercular disease of bone is always dependent upon infection of the marrow of bone by the tubercle bacillus. Miliary tubercles are formed, which become caseous, and by fusion of adjoining caseous areas an area of softening is produced in the bone marrow.

Later on the bony trabeculæ become involved in the caseous areas, and are softened, and dissolved, and may break down and form a definite cavity (tubercular abscess), or a portion of the softened trabeculæ may persist as a definite "sequestrum" lying in a cavity surrounded by tuberculous tissue.

Generally the tuberculous process begins in the epiphysis in the long bones, and rarely in the shafts.

Since the process arises in the epiphysis, and extends peripherally, the tendency of the tuberculous process in long bones is always to extend to, and infect, and involve adjacent joints. It may be taken as a general rule that in most cases of tubercular synovitis of joints, a primary focus of the disease is present in an adjacent epiphysis.

The Röntgen rays applied to early cases of tubercular disease of bone do not offer much assistance as a rule.

It might be supposed that since the use of the Roentgen rays in joint disease has become common, that it would become possible to determine in all cases whether or not a primary focus was present; but this is not the case, because there may be an extensive bone focus, with an extensive affection of the entire synovial membrane, long before the bone focus has caused a sufficient destruction of the lime-containing trabeculæ of the adjacent epiphysis to make this lesion apparent on Roentgen examination.

This point is of much clinical interest, because in operations upon tuberculous joints it should always be the aim of the operator to remove not only the obviously tubercular lining of the joint, but also the original focus in the epiphysis.

Theoretically the ideal treatment for early joint diseases would be to recognise by the Roentgen rays the existing primary epiphyseal focus, and to remove it before it had extended into, and infected the joint.

With more perfect development of Roentgen technique, and with extension of a more accurate knowledge of the pathology of the joints, such ideal treatment may become as possible as it is desirable; but at present the difficulty is that the extension into the joint ordinarily has taken place long before the Roentgen rays give an accurate indication of the presence of the original bone focus.

Sarcoma of Bone.—Sarcomata are the most common tumours of bone. They are malignant, and when removed tend to recur either locally or by metastases in different parts of the body.

The metastases usually are distributed by the circulation. They may arise from the marrow, frequently in the jaw bones, and in the marrow of the long bones.

They generally arise in the epiphysis of the bone, and extend to the shaft only at a later stage of their development.

As the tumour advances it causes a softening and an absorption of the original cellular marrow, until it approaches the periosteum.

In many cases the periosteum then begins to proliferate, and forms a shell of periosteal bone surrounding the tumour. In that way the shell of the bone oftentimes becomes very much enlarged before there is any extension of the process through the shell to the adjacent soft tissue.

By destruction of the marrow, and of the cortex, great softening of the bone may occur, so that spontaneous fractures not infrequently are seen.

The cellular structure of the medullary sarcoma varies, being either small or large round celled sarcomata, spindle celled or fibrosarcomata. In many cases large giant-cells are also present, producing the so-called giant-cell sarcoma.

Sometimes bone is produced in the tumour, when it is called an osteo-sarcoma.

After attaining any considerable size, most sarcomata undergo various retrogressive changes, either from necrosis or hæmorrhage, leading to softening, and destruction oftentimes of a great portion of the original sarcomatous tissue.

In certain cases the entire centre of the tumour becomes softened, and disintegrated, and only a small periphery of sarcomatous tissue is left, surrounded by a shell of new periosteal bone. Often spontaneous fracture may be the first indication of sarcoma of bone.

Other sarcomata arise from the periosteum.

Any portion of the skeleton may be affected.

Sarcomata which arise from the periosteum may be of any one of the cellular types of sarcoma, although fibrosarcomata often arise from the periosteum. The tumours usually originate from one side of the bone, although occasionally they entirely surround the bone.

In the periosteal sarcomata, a new formation of bone is common, and the bone is frequently arranged in a radial way, giving a most remarkable picture in dried specimens or in roentgenograms.

According to Eisendrath both the endosteal, and periosteal types have as seats of predilection the epiphyseal ends of the long pipe bones. The following table shows the percentage:—

| | | | |
|------------------------------|-----|-----|--------------|
| Upper epiphysis of tibia ... | ... | ... | 35 per cent. |
| Lower end of femur ... | ... | ... | 18 per cent. |
| Upper end of humerus ... | ... | ... | 13 per cent. |
| Ulna and radius ... | ... | ... | 4 per cent. |

A roentgenogram is of value in distinguishing bone neoplasms from inflammatory processes or trophic changes.

It may be said that the more cellular types, like the periosteal, and the small rounded myelogenous sarcomata generally show a translucency or faint shadow wherever the bone has been involved. The ossifying periosteal and myelogenous sarcomata give the most typical pictures.

In the former the fine spicules of bone are seen radiating from the periosteum.

In the central or myelogenous osteo-sarcomata the roentgenogram shows a deep shadow with irregular margins throughout the extent of the growth, thus differing from the soft myelogenous forms which show a faint shadow.

Benign Tumours.—True or simple bone-cysts.

This tumour, as the others, may produce a spontaneous fracture. If such be not the case, there is generally pain over the epiphyseal ends of one of the long pipe bones which has continued from months to years, usually followed by the general enlargement of the bone. The bulging itself is often uniformly firm, but palpitation reveals many soft compressible places. A roentgenogram will reveal a characteristic light area surrounded by the clear narrow shadow of the expanded cortex.

The chief conditions from which it must be differentiated are a chronic bone abscess resulting from a former osteomyelitis, syphilis, tuberculosis, and osteo-sarcoma.

In many cases an exploratory incision will be necessary to clear up the diagnosis in these cases.

A cyst is filled with a thin yellowish serous fluid, while an osteosarcoma is solid throughout.

It must be remembered that echinococcal cysts may occur in bone. They may reach considerable size, and from pressure may cause a lacunar absorption of bone, with necrosis of the marrow.

It must be remembered that cysts may occur as the result of the degeneration and softening of bone sarcomata.

Some of the cases of bone-cysts undoubtedly represent the entire destruction of sarcomatous processes.

In a paper on benign cysts of the long bones by Robert Jones and David Morgan, published in the *Archives of the Roentgen Ray*, April, 1907, they state that so far only about fifty cases have been reported.

It is difficult, however, from a roentgenogram to differentiate with certainty a benign bone cyst from a slow-growing medullary sarcoma. The authors conclude that there are certain points, however, which are helpful to distinguish them. In the benign cyst the edge of the bone is more definitely marked, less irregular, and suggests a thinning which, starting from the centre of the bone, expands very equally in all directions. The mottling is very slight, and the translucency is definite to its very circumference.

If it occurs in the end of the bone, the epiphyseal line is not invaded. Its growth is more evenly from the centre than in osteo-sarcomata, when the expansion is uneven, the cavity more honeycombed, less translucent, the edges more irregular, and the growth usually invades one side of the bone more than it does the other.

Before concluding this paper, it is only just to mention that many of the pathological descriptions have been obtained from that excellent work, *Keen's Surgery*, and I think you will find on careful examination of the roentgenograms which are exhibited that practically every detail mentioned is illustrated in a more or less definite manner.

DISCUSSION ON DR. HERSCHELL HARRIS' PAPER.

Dr. MORRIS (Melbourne).—I agree with all said with regard to the use of radiography in connexion with kidney troubles, but I would like to differ somewhat with regard to the subject of stone in the bladder. The stone may, for instance, be in a pocket, and in that case I think a radiograph would not help us to a correct diagnosis; but in the case where there was an enlarged prostate, it might be of great assistance in coming to a correct diagnosis.

Dr. CLENDINNEN (Melbourne) said:—It is a curious fact that there are so many cases of stone in Sydney, and very few in Melbourne. We

get a very few stones, and for this reason I should like to know the opinion of Professor Skeats on the geological formation of Queensland and New South Wales. I notice in Sydney that the water is very much harder than the Victorian water, and I certainly advise you all to go over to the Museum, and see the wonderful results Dr. Harris has achieved in this renal sphere. As regards Dr. Harris' methods of procedure, the method I adopt is, of course, something similar. I have an iron plate at the base, with a broad front, with sandbags on the end, so as to minimize the diaphragmatic movement. I do not know whether Dr. Harris' method is any better, and if it keeps the patient motionless. With regard to exposure, Dr. Harris evidently believes in a long exposure, and I think it advisable to follow his plan. As regards the changing of tubes, I would not like to recommend that, for the interchange of tubes would certainly change the shadow, and you would get a penumbra of the shadow you might have got with the first tube.

Dr. ARGYLE (Melbourne), said:—It is quite a treat to hear such words from a man who has had so large and varied experience in the matter of skiagraphy and of renal stones. In the hospital experience I have had at the Alfred, a fair number of cases have been sent of prospective stone, but I have not in the last six months discovered a single stone, although in my private practice I have run across one or two. With regard to the technique which Dr. Harris has advocated, I would like to say that I follow the same technique myself, using the soft tube, and with a compressor for the diaphragm, pressing it down into the patient to the greatest possible extent consistent with the patient's comfort. In that way, I have been able to get clear pictures on subjects from 1 to 15 inches thick, and the exposures I generally give are from two to three minutes. I have never had occasion to give more than 10 amperes of current in voltage with a break. We all must agree with the dictum of Dr. Harris that it is necessary to skiagraph the whole renal area, but I am afraid that that is not always possible, and although the expense is rather large, yet the question of time is more important. I have found it very difficult to make a thorough examination in the hurry of the work that has to be done. Dr. Harris has said that no maps have been published of the complete renal area, but Dr. Bruce's map gives a very definite area, with the stone area in both kidneys. It is a very clear work. With regard to a surgeon not being able to find the same stones as the Roentgenographer, I intend, if possible, being present, as I have found the stone the surgeon has failed to find.

Dr. HARRIS, in replying, said:—With reference to Dr. Morris' remarks, and the case referred to by him, I think it would be safe to apply the rays first. Dr. Clendinnen refers to the question of changing of tubes. I have done that several times, but I would not recommend others to do it, because unless the tubes exactly correspond, there must, of necessity, be distortion. Although the compressor I use is fairly satisfactory, I think it is not as satisfactory as it might be. We have not a satisfactory diaphragm compressor, and I am waiting for a better one to come out. There is room for great improvement. With regard to the question of exposure, the difficulty with us in Sydney is to get good tubes. Most of my tubes I get from Melbourne, and I have often been waiting in the hospital for months for a satisfactory tube. In my private practice I have 30 or 40 tubes, but only about half-a-dozen good ones.

Referring to Dr. Bruce's map, mentioned by one of the previous speakers, I may say that I have seen it. I am sorry to say that in Sydney there are unqualified men who deal with this sort of work, and I cannot say I altogether blame them, but rather the men who send the patients to them. I have no feeling in the matter, but it is not fair to other men who are duly qualified.

IONIC MEDICATION: ITS EXTENDED APPLICATION.

A. A. DOYLE, F.R.C.S.I., ETC.

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In an oration delivered last year to the Dermatological Society of Great Britain and Ireland, the late Professor Lassar, referring to the paucity of methods at the command of the dermatologist thirty years ago, remarked—"The whole equipment of the skin specialist consisted of a block of paper and his pencil, with which to write prescriptions of a dozen different ointments." To-day we find the skin specialist almost hampered by an array of appliances so formidable that it becomes a heavy financial strain to procure them, no small exaction on his time to acquire a knowledge of their intricate mechanism and efficiency, whilst the liability to constant modification renders the expensive outfit of a few months ago obsolete, before he has become familiarized with its full usefulness; before, in fact, it has covered the expense of its installation. Such has been the change since Lassar first entered the domain of dermatology, which was as wide then as now. But he admits—and one has no difficulty in appreciating the full truth of the ingenuous admission—that at the time to which he refers but little could be done.

Despite the unwieldy mechanism in the armamentarium of the skin specialist of the present time, he can achieve much—although his natural abilities may be but mediocre—which the intrepidity and genius of Lassar could not accomplish in the days of which he spoke. Yet, even so, there is still a large scope for further conquests. The integumentary envelope of the body presents many conditions which defiantly resist all known agencies. And this not only applies to the class of diseases generally recognised as intractable, but to types histologically and clinically similar to others which we had previously found responsive to simple measures (the reaction of tissues which the microscope proclaims alike in structure, does not at all times conform to the ideas we gathered from an earlier experience in treatment). A moment's retrospect will suffice to bring to each one's mind times of disappointment, when favoured remedies had been tried, known resources exhausted, yet defeat confronted him the while. Perhaps at no distant date our lexicon will be fashioned after that commended by the great Richelieu to the consideration of his youthful protégé, and contain within its pages no such word as fail. The day has, however, not yet arrived; but he who furnishes the means to effectively efface one malady contributes towards this end; and as the first conception of its efficacy finds wider application in the hands of others, our indebtedness to him proportionately increases.

Concerning the identity of the ingenious individual who first conceived the idea of introducing electrolytic substances through the skin, thereby putting ions to a direct therapeutical use, I am not altogether clear. It is certain that Benjamin Ward Richardson in 1859 worked in this direction; but owing, it is stated, to unsympathetic criticism, and failing to convince his colleagues, he abandoned the method. His name, nevertheless, stands associated with the primary idea, which fell short of practical utility in his hands because of the lack of a kindly encourager who would have counselled perseverance.

Edison thirty years later suggested electrolysis as a means whereby drugs could with advantage be introduced into the tissue; but even the fame of this very practical investigator was not sufficient to induce wide-spread enthusiasm at the time he published the result of his investigations. A few disciples there were to be found here and there, but the records of their experiences failed to stimulate more than inconsequent notices in the journals in which they appeared.

A modest note contributed by Professor Leduc in 1903, referring to a case of rodent ulcer cured by ionic medication, gave to the method the impulse necessary to attract more general attention. This localized disease affords the most perfect conditions for observing the effects of treatment—conjectures are practically precluded, since there are rarely complicating features to disguise or modify the inferences to be drawn. Leduc found cicatrization follow a single application of zinc ions within a period of fourteen days. This result constituted direct evidence of the signal efficacy of the treatment applied; but only so far as the single case instanced. Yet it sufficed to create at once a widening circle of inquiry, it appealed to those who desire a rapid and unequivocal response when the technique required to attain such is devoid of irksomeness. And my experience leads me to believe that their desire has been in a great part gratified; but not altogether. A certain percentage of rodents, whether early or of long standing, whether extensive or circumscribed, demand many applications before cicatrization is completed. Then again (and here I would have it understood that my opinion is based upon observations of but seven cases, extending over a period of little more than a year—not a sufficiently large experience, perhaps, to permit of dogmatic pronouncement, but yet extensive enough to warrant the expression of an individual opinion), I fear it will be found that recurrence is more frequent than the hopeful nature of early reports suggests. When introducing the ions into the tissues I adhere to the procedure prescribed by Leduc, varying only in the matter of current intensity in accordance with the toleration of the subject; yet I have found that within six months after the completion of cicatrization recurrence took place in 25 per cent. of the cases.

Disappointment such as this lessens confidence, but stimulates to renewed effort. I opine it saves us from "the physiology of backsliding." I did not abandon ionization in the treatment of rodents, but chose to assign to it a less extensive task than that which I had been led to believe it was capable of performing, if not with unvarying success, at least with a greater consistency than it had done in my hands. But I think we have all learned that many of the claims made for new remedies are proved invalid. Time repudiates first credentials, the facile pens which wrote them appear to be strangely biassed. To arrive at a just estimate of modern medical creations one must personally demonstrate their worth.

It was, however, apparent that in the early circumscribed cases ions of zinc induced rapid healing, and in portions of the later and more extensive ulcers, repair was also more quickly promoted. This did not occur in any of my cases as an immediate sequence, but nevertheless it was gratifyingly quick.

When this stage has been reached, I have in my later cases resorted to radium therapy, applying it but lightly over the areas already repaired, but inducing a fairly brisk inflammatory reaction in those resistant to the influence of the ions, and in the cartilaginous borders, nodules and subcutaneous infiltrated areas. The radium irradiations so applied appear to me to fulfil a twofold purpose. They (1) render the already formed scar a permanent structure, possibly by destroying remaining traces of disease unaffected by the electrolytic elements, even although these latter have been brought into direct contact with them—it has long been recognised that different areas of a rodent exhibit marked differences in degrees of responsiveness to all forms of treatment yet devised, this we learned long before electro-therapeutic applications were recognised; and (2) by reducing the resistance of the impenetrable areas. The phenomena attending inflammation, the hyperæmia, the flushing with lymph, &c., facilitate the entrance of the ions into the lymph spaces and protoplasm of the cells. This method of increasing the conductivity is greatly superior to the use of a zinc needle as an electrode and boring apparatus, for under no conditions have I found ionic medication an entirely painless procedure, the forcible disruption of the tissues by needling entails actual distress, no matter what anæsthetic has been used, and if this performance were an essential feature of the principles underlying ionic technique I suspect serious limitations would arise.

During the past five months I have used the combined method of treatment in four cases (not including the group of seven already referred to), and in these I found that healing followed much more rapidly than when Roentgen radium treatment or radium alone had been used, and more perfectly than when ionization was the sole method employed. I am entirely hopeful that a permanent cure has been secured in the patients so treated; so far there have been none of the subjective symptoms complained of that so frequently precede by a considerable period the re-involvement of the scar. This is the more significant in view of the fact that two of the individuals are singularly alive to suggestive sensations, recurrence after X-ray treatment having been experienced by them more than once. Beyond stating that I use a current of 10 to 15 ma. with milliamperemeter and readily adjustable resistance in the circuit, flexible and rigid electrodes, 10 mg. radium bromide—of unestimated radio activity—I refrain from discussing technique, since I assume that at this stage of our understanding of the principles of ionic medication to do so would be mere commonplace. I refrain, too, from recounting the varied features the ulcers presented, their gross and minute differences, their history, duration, &c., the matter such a narration would furnish would be extensive, but altogether devoid of interest.

Since we are as yet unable to stake off the diseases over which ionic medication exercises a beneficent influence, and recognising that we have so far no rules formulated to guide us whereby this may be readily determined, I think that one is justified in regarding this as an experimental stage, and submitting a brief account of such morbid conditions as appear to him to be favorably acted upon, even although they be taken at random,

as it were, and unmethodically ranged for inspection. In this way a wider application may come to be understood and limitations defined. I will therefore submit, without redundant history, for consideration, a few instances wherein ionic medication proved in my hands of undoubted value.

There is often a close similarity between the microscopic structure of moles and that of rodent ulcers. There is, too, very frequently a close resemblance in the clinical appearance of the carcinoma which attacks moles and that of the less malignant rodent. Having already witnessed the effect of ionization on the latter, I availed myself of the opportunity which two patients gave me of applying it to the former. The features in both cases were very nearly similar—early superficial malignant manifestations occurring in flat pigmented moles, situated one on the malar, the other on the temporal region. There was but very slight ulceration, some deep infiltration, but no undermining of the skin around. There were no obvious deposits in the glands, or other evidences of metastasis. My diagnosis, however, lacked a histological report to confirm it; but the clinical appearance strongly emphasized the type and clearly differentiated it. I used ions of zinc and copper alternately, and both cases showed rapid improvement, healing being completed in one after the sixth application, in the other after the eighth. I have not heard of a recurrence since they passed from my observation four months ago, and I exacted a promise that on the first appearance of such I was to be advised without delay. These cases tend to show that ionic treatment is not limited to a specialized form of skin neoplasm. In opposition to the treatment here exhibited, it may, however, be well to recall Hänel's assertion, that operation is specially indicated in superficial carcinoma, and Rupprecht's statement that the curability of superficial carcinoma is unimportant, the regional lymph glands requiring removal in all cases.

My personal experience with Roentgen therapy and radium therapy does not support the universal application of these views, while the reports of Schär, Görland, Werzberand, and many others refute them, numerous cases having been completely cured by those electro therapists. Holding, however, strenuously maintains that the term "completely cured" is not justified by the results attained. It is, perhaps, wise to invoke the aid of the surgeon where there exists the smallest doubt as to glandular infiltration, or where exalted virulence is suspected, although, unfortunately, extirpation by the knife is often more apparent than real. Both my patients declining to submit to operation, I was released from the responsibility of discriminating between the methods to be employed.

I now turn to the consideration of ulcers benign, and therefore less formidable, yet often of a most obstinate nature—those occurring on the legs. The predisposing causes are numerous, but the turgescence of varicosity is the most frequent and important of these. "There is no treatment recognised for the general treatment of varicosity, and no internal treatment for varix." This is the pronouncement of Sabouraud, and the truth it proclaims has been long recognised. It might also, with some modification, be applied to the ulcerative sequence of varicosity, since there has been no treatment so far devised that has not at one time or other proved useless in combating with this condition. It has defied the surgeon and dermatologist alike, and committed the afflicted individuals, who were, perhaps, otherwise robust, to painful locomotion or the invalid's couch. As a rule one is unable to greatly modify effects if the cause remains unchecked; but this luckily does not altogether apply to leg ulcers.

We have all seen them in their foulest form, and later seen the site of their location completely healed over, the varicosity, however, existing unchanged.

Reference to the many features these ulcers present would be a dishing-up of common knowledge. It is only necessary for my purpose to refer to such aspects as are of importance to the applier of ionic medication—a treatment that, so far as I know, has not been previously adopted in these cases.

Where the epidermis is alone destroyed, the floor of the ulcer being formed by the papillary layer of the corium—before the destructive process has reached the subcutaneous fascia—the ions of copper and silver, alternately applied, bring about a rapid healing. The surface of this ulcer is smooth, and admits of the electrode being brought into good apposition when applied with uniform pressure, and there are no marginal wall-like elevations to contend with. The patient, too, will be found to support the maximum current of intensity, with less discomfort, than when the facial region is being dealt with. Any attending eczema—which is in nearly all cases pre-ulcerative—may be easily dispersed by a few exhibitions of the X rays.

Three cases of varied chronicity have been so dealt with by me in recent months, many drugs having been unsuccessfully used before coming under my notice. I in no way restricted the patients' movements whilst under treatment, permitting absolute freedom in pursuit of their avocation, which in one case—that of a barmaid—entailed standing for many hours at a stretch. In two the sores were bilateral, in one unilateral and multiple. At the time of writing the repaired tissue is firm and healthy.

Where the ulcer has become a deep excavation, the papillary body or the entire corium destroyed, the edges steep, the floor calloused and almost, if not quite, devoid of granulations, the utility of electrolytic medication is not so dramatically striking, nevertheless, the ions of silver and zinc will be found to play a very useful part in terminating the worst features of these tormenting microbial infected sores. They stir the surface into action, and a generous outcrop of granulations cover the floor after the fourth or fifth seance. There is no amazing rapidity exhibited in the filling in of the cavity; but it must be remembered that the nature of these sores implies indolence, whilst the condition of the limb, usually œdematous with thin walled valveless veins, is opposed to reparative change.

I have now employed ions of the electrolytes mentioned in seven cases of varied extent (one had a diameter of seven centimetres) and of varied duration, all having been previously treated by methods and drugs, which had found favour with the several practitioners under whose notice they had come, and I recognise that with no other form of treatment known to me (not excepting Professor Unna's much exploited adhesive zinc dressing) could I have secured results comparable to those promoted by ionic medication. The thickened marginal tissue is at all times an obstacle, the normal skin, considered as an electrolyte, is poor in ions, and has high resistance. The indurated tissue which surrounds these ulcerous cavities offers a resistance too high to permit the transmissions of ions to a useful depth when a current of an essentially safe magnitude is employed. We are, unfortunately, not yet in a position to adjust the process to cope with the varied phases of conductivity exhibited by tissues invaded by disease, or influenced by its proximity. It is still in its early evolutionary stage,

and the unfolding of all new principles of scientific medicine is attended by speculation and haphazard application. For the present our attention must be directed to rendering thickened and keratinised patches less resistant to the electric impulse which introduces electrolytic substances. With this purpose in view, I have been employing salicyl ions, using a solution of salicylate of soda, which being electro-negative in its chemical relation is applied to the negative electrode. I am not altogether satisfied with the results achieved.

Whilst treating one of those leg patients—an electrician—he informed me that for some months he had been suffering from an extremely painful anal fissure. It had been previously cauterized, but only a very temporary relief followed. Noting the improvement in the leg sore, and the principle of ionic medication appealing to a mind that ran on matter electrical, he suggested that it might be useful for his anal trouble. I readily concurred with the idea, and the patient himself fashioned a suitable electrode—a zinc rod the size of a number eight catheter slightly curved at one end. Having with the aid of a speculum located the ulcer, and thoroughly cocainizing it, I applied the electrode wrapped in lint saturated with chloride of zinc solution. I used a current of 15 ma. for twelve minutes. In a week after this seance, pain during defecation was very much reduced, but not altogether abolished. I then, in accordance with the patient's request, made a second examination, and found that the ulcer had become considerably contracted, only a small patch remaining. This was again electrolysed, and ten days later the patient reported that defecation was no longer attended by pain or perceptible discomfort, and he enjoyed freedom from such when I saw him three months later.

Within the year cases of lupus erythematosus favorably influenced by electrolytic medication have been reported.

Prior to the appearance of these reports I had been treating one case on these lines. The disease, when I saw the patient, a middle-aged female, was in a comparatively early stage—between six and seven months. It was of the discoid variety, the patches isolated, one on the forehead, one on the bridge of the nose, and others almost symmetrically distributed on the malar eminences. They were mostly covered by characteristic squames, but the borders were raised, red and inflammatory. I learned from the patient that the disease was spreading, and there was no evidence of any of the spots undergoing central involution. There was no history of tuberculosis associated with the patient or her people. I estimated the tuberculo-opsonic index twice, at intervals of a week, but found it on both occasions well within the margin of health (0.95-1.02). The co-existence of tuberculosis with lupus erythematosus appears to be accidental. I used copper and salicin ions at alternate sittings. The improvement in each patch so treated was well marked after the fourth application, the centres becoming pale and smooth, the disease receding, the potency of the ions being established beyond a doubt. Up to this point all the eruptive spots uniformly responded, and although there was no evidence of extension in any one of them, the borders remained prominent, though perhaps somewhat less florid, and so they remained during three months of further treatment. As I write the disease is perceptible, but not greatly disfiguring. Possibly this may have been a singularly obdurate type, or the sittings may not have been sufficiently prolonged. The patient during the application complained of nausea and vertigo, and was with difficulty prevailed upon to retain the electrodes in position for a

period sufficiently long to permit of the ions travelling to a requisite depth.

Commissural fissures of the lips are occasionally difficult to heal, even when a specific history is justifiably excluded. A young woman presenting such lesions—bilateral—came under my care in the beginning of the year. They had existed without recession for over two years, a multiplicity of pharmaceutical preparations failing to alleviate the distress which accompanied them. There had been no impetiginous eruption on the face, and at the time I saw her there was no dermatitis or lesion other than the fissures. In all respects the girl appeared healthy and vigorous, her teeth were sound and well kept, the nares anterior and posterior and pharyngeal wall were free from disease or blemish. She was not a mouth breather or slaverer. It was difficult to ascribe the condition to a streptococcic salivary infection or any of the causative factors which lead to *perleche*. I applied the ions of copper at half a dozen sittings, the fissures healed over, and when I last heard from the patient there had been no recurrence.

Perhaps I have already placed before you a sufficiently long account of my personal experience with ionic medication to generate in others a desire to make an excursion into this new region of electro therapeutics. There is much to discover therein, and doubtless many treasures await the investigator endowed with faculties to observe and remember. So far there is but little understood, but very much to learn and systematize. We have not even yet arrived at a satisfactory explanation of dissociation or formation of ions. Many theories have been advanced, none entirely acceptable. We cannot gauge with exactness the E.M.F. required to separate them from their electrical charges. We know it varies, not the extent of the variations. We still but speculate as to the effects produced by the ions we introduce. We visualise them flowing amongst the lymph spaces, and entering the protoplasm of the cells, dispelling disease as they flow. It is as yet but a fanciful conception; but if we regard even with conservative view, the results already achieved when we are but crude manipulators unversed in the regulation and the potentiality of the medium we employ, it is not unreasonable to anticipate its gradual fulfilment.

RADIUM, LIQUID AIR, AND CARBONIC SNOW IN TREATMENT OF SKIN DISEASES.

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At the Sixth International Dermatological Congress, recently held at New York, Dr. Abbe, of New York City, read a paper upon his experiences of the treatment of certain skin diseases with radium. He also exhibited some moulages to demonstrate the excellent results he had obtained in the treatment of epitheliomata of the skin by radium. I was particularly interested in his remarks, as I have had considerable experience in the treatment of skin diseases with radium in Australia. In speaking to Dr.

Abbe's paper, I drew attention to the special value of radium in the treatment of chronic seborrhœa of the eyebrows and the scalp. In this condition radium applications have the advantage over treatment by the X-rays, in that the former are more easily controlled, and not so likely to cause alopecia. Radium is also peculiarly suitable for nævus flammeus, and pigmented moles upon the face. These disfigurements can be removed by radium with a better cosmetic result than by other methods, including electrolysis, liquid air, carbonic snow, &c.

During the past five years I have treated a large number of rodent ulcers with radium, many of which, treated several years ago, remain well. In some cases, a recurrence of the disease has taken place. In recurrent cases I have noticed subcutaneous nodules make their appearance about the fourth or fifth month after treatment has been discontinued. These nodules may be made to disappear with further applications of the radium without injuring the skin, beyond causing a redness, which takes some time to disappear, but not causing the pain of an X-rays dermatitis. On account of the tendency to a recurrence, I now make a practice of giving the part treated a prolonged exposure to the radium, once a month, for three months after the disease has apparently disappeared. In the treatment of nævus flammeus (port wine stain) upon the face, I prefer to apply radium only; the treatment is slow, but the after results are more satisfactory than by other means. However, in the treatment of angiomatous nævi, I combine radium treatment with the more quickly acting methods of treatment by liquid air or carbonic snow.

Liquid air, now obtainable in Melbourne, is used more particularly for chronic patches of lupus erythematosus, also moles and nævi. Particular care should be taken in the application of liquid air or carbonic snow to the skin of infants, and in adults who have been chronic alcoholics. In these cases, the tissues may not recover after an ordinary application of these remedies, and a nasty slough forms, and healing takes place very slowly.

Carbonic snow is very useful where the condition to be treated consists of several small spots, as one can use the snow in the form of a pencil point, and can control its application better than liquid air. I use carbonic snow as a stimulating application in ulcerated legs.

THE ORIGIN AND DEVELOPMENT OF RADIOTHERAPY.

By W. R. Fox, L.R.C.S. *et* P., EDIN.

The discovery in the end of 1895 by Professor Roentgen of the invisible rays, with their wonderful penetrating power, emanating from an excited Crooke's tube, marks the beginning of an epoch in medical science. Previous to this event, the examination of interior organs of the living body, as well as the determination of the nature and extent of internal injuries, whether of bone or of soft structure, depended largely, or almost entirely, upon methods of auscultation and percussion, and upon the sense of touch. Although these methods had been developed by long and patient practice into a fine art, and the tactile sense had in like manner become the "tactus eruditus," yet they would appear, in many cases, to recede into secondary positions when compared with the newer method of examination by these rays, which added to the information afforded by the older methods the invaluable evidence of the sense of sight.

Roentgen's discovery, however, did more than this. It added, practically speaking, a new branch to medical therapeutics, for it was soon found that these rays produced under certain circumstances extraordinary effects upon living tissues. Investigation of these phenomena rapidly led to the discovery that these radiations exercised remarkably beneficial effects in many diseased conditions. This new therapeutic method was called "Radiotherapy," even its name having to be freshly coined to fit the new subject. The development of radiotherapy is therefore the outcome of, and hence is collateral with, the development of the X-rays. Yet just as the X-rays are not entirely the result of Roentgen's investigations, so radiotherapy is not exclusively limited to the X-rays. The discovery of the new radiation came in so unheralded a manner, and was announced with such dramatic suddenness, that nearly every one, without some special knowledge of the subject, attributes the full merit of this scientific triumph to Roentgen solely. The merest retrospect will, however, suffice to render manifest the many years of painstaking scientific experiment and research that preceded and led up to what appeared to be almost an accidental discovery on the part of Roentgen. It is now clearly evident that for nearly thirty years prior to this the work of Hittorf, Hertz, Crookes, Lenard, and others, was preparing the way for the final step of Roentgen along that path of light which had its small beginning in the tiny electric spark produced by von Guericke two hundred years ago, and whose whole extent is brilliant with the discoveries of such men as Franklin, who discovered the positive and negative forms of electricity; Geissler, whose air-pump and glass vacuum-tubes afforded the first means of studying the electric discharge in rarefied gases; Sprengel, whose mercury air-pump marked a great advance in the mode of producing vacua; and Faraday, who discovered the principle of electric induction, upon which Rhumkorff afterwards constructed his coil. The beautiful experiments elaborated with so much care by Crookes in the course of his investigations, extending over many years, into his theory of "radiant matter," and his many observations on the properties of the stream of rays within the vacuum-tube, as well as the experiments of Hertz, who showed that this stream of rays would pass unchanged through gold-leaf and some other metallic substances, and the observations of Lenard, who proved conclusively that many of the phenomena of these cathode-rays could be demonstrated outside the tube, all compel one to wonder why this new form of radiant energy was not discovered long before.

Probably the origin of radiotherapy, as applied to skin diseases, dates from an experiment made by Freund, of Vienna, in the end of 1896. This experiment was prompted by a newspaper report of the case of a worker with X-rays becoming affected with dermatitis, accompanied by extensive loss of hair from the head, and also by an article in a German medical paper detailing similar effects on the head of a young man after exposure to the rays. Freund's experiment consisted in attempting to remove the hair from a very large pigmented naevus in a young girl by means of the rays. The result was certainly, to say the least, surprising. As a consequence of very excessive overexposure, severe dermatitis occurred, and was followed by extensive and dangerous ulceration, which took a long time to heal. This powerfully impressed Freund with the necessity for observing certain precautionary measures, the due exercise of which would have entirely prevented this untoward result. The final effect, so far as the naevus was concerned, was, however, so distinctly favorable that Freund was encouraged to persevere with the experimental employment of this powerful

agent, in spite of vigorous warnings from Kaposi. He next tried it in lupus vulgaris, and, in conjunction with Schiff, was soon able to report two cases of this disease treated and cured by means of the X-rays. Soon afterwards, reports followed in quick succession of favorable results in various kinds of skin disease treated in this manner. It was, for instance, used with more or less success in the treatment of chronic eczema, sycosis, psoriasis, acne, tinea, alopecia, areata, lepra, and other skin affections, and it soon became quite evident that it possessed curative powers sufficient to render it almost indispensable in the treatment of some of the diseases of the skin.

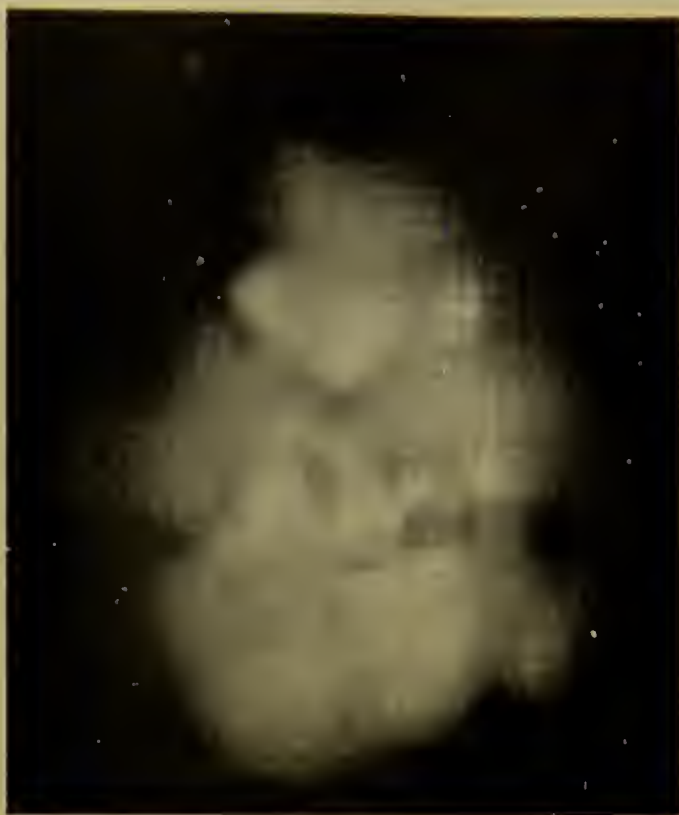
It was but natural that so powerful an agent should be tentatively pressed into service in the crusade against cancer, and the columns of the medical press for some years past contain very numerous records of cases of malignant disease treated by its means. The results in some of these cases showed that it undoubtedly exercised sufficient influence over the disease to cause its disappearance; in other cases to check or control its advance only; while in others, again, the results were quite negative. There can be no doubt, however, that under certain circumstances and in certain cases this form of radiation exercises a remarkably retarding influence over the development of the cancer cell. This is manifest both from the diminution, or even the disappearance of the disease (notwithstanding that, in some cases, it may recur), and from the evidences of degenerative changes plainly shown in other cases by microscopic sections of the malignant tissue, which had been subjected to X-ray treatment before removal. It seems, however, difficult or impossible to accurately define, at present, the circumstances or conditions under which its influence is most favorable.

In the treatment of a local malignant condition, such as rodent ulcer, however, its success is unmistakable. In its earlier stages, before this disease has attacked the bony structures, treatment by the rays is nearly always successful, and in these successful cases the results show it to be one of the most satisfactory methods of dealing with this intractable malady.

It is impossible, within the limits of a short paper, to detail all the diseases in which treatment by the X-rays has been more or less successfully employed, but it may safely be said that this method of treatment has met with quite sufficient success in many of these to give it a permanent place as a valuable therapeutic agent.

Now, a Crooke's tube is not the only source of X-rays. They are also found in the emanations of radio-active substances, of which radium is the chief. The emanations from these radio-active bodies are, however, not exactly identical with those from a Crooke's tube. Both consist of a number of different radiations, some of which, such as X-rays, are common to both. Hence, X-ray photographs may be obtained either by means of an excited Crooke's tube, or by means of radium. Treatment by means of radium is being extensively tried, or, perhaps, I should say, as extensively as the extreme costliness of the material will permit, with results which, in many cases, resemble those obtained by employing X-rays.

The beneficial effects of certain natural mineral springs in some of the European spas have long been known, and have never been satisfactorily explained. It is now suggested that these are due to the radium contained in the water, but no very clear explanation of the manner in which this acts has yet been offered. The existence of radium or other radio-active substances has been demonstrated in the waters of many of these spas, as,



Photograph of Wire Gauze taken by Radio-active Mineral from Central Australia.



Piece of Radio-active Mineral which took the Photograph.

for instance, in the natural springs of Bath, in England, and in the waters of a large number of the Austrian and other Continental health resorts. The most important of these is Joachimsthal, where the pitchblende is found from which M. and Madame Curie obtained the first samples of radium. Here the water from the mines is now being utilized for bathing purposes for invalids, and the establishment of a "radium curhaus" is projected by the local authorities. That this water possesses more power than one might cursorily suppose will be evident from the report of the experience of the "Bad Gastein," which shows that its employment is followed in many cases by satisfactory results, but that if it is incautiously used, untoward and dangerous symptoms are very apt to follow.

It is only reasonable to presume that, in a country possessing such extensive and varied mineral wealth as Australia does, uraninite, or some other variety of radium-bearing ore should be found somewhere amongst its vast deposits. Therefore, although it will, no doubt, prove interesting to show you a specimen of such an Australian mineral, it can scarcely be expected to come as a surprise. This specimen comes from Central Australia, where I understand there are large deposits of it. It is known as carnotite, which is, I believe, a variety of uraninite or pitchblende. In order to test in a simple way whether it contained any perceptible amount of radio-active substance, I submitted it to the following experiment. Enclosing an ordinary photographic plate in a light-tight bag, such as used for X-ray work, I placed a piece of the carnotite upon it, interposing between the piece of mineral and the plate some object, such as a piece of common wire gauze, which would produce an easily recognised image on the plate. The result, as shown by the accompanying photograph, shows the mineral to be powerfully radio-active. Further experiments show that it will rapidly discharge a negatively charged electroscope, a further evidence of its radio-activity, and that it is attracted by a magnet. From this it is quite clear that radium and other radio-active substances are to be found in Australian mineral deposits.

Phototherapy, or treatment by means of light; or, to be more correct, by that portion of light vibration known as the ultra-violet rays, is really a branch of radiotherapy. The name of Finsen, who practically gave up the whole of his life to this subject, is inseparably connected with it.

So far back as 1878, Downes and Blount showed before the Royal Society of London that sunlight exercised a deleterious, or even fatal, influence over most bacteria, and, further, that this action is due to the actinic rays in the violet and ultra-violet end of the spectrum. In 1885, Duclaux published his researches on this subject, and declared his belief that sunlight is the best, the cheapest, and the most universally applicable bactericidal agent that we possess. About the same time, Arloing showed that the bacillus anthracis grows better in darkness, or in the rays at the red end of the spectrum than in the violet. Afterwards, d'Arsonval and Charrin demonstrated that it was the actinic rays in the spectrum only that exerted a destructive influence over the bacillus pyocyaneus. Did space permit, many further details could be given showing the germ-destroying power of the ultra-violet rays.

The colour of the negro's skin, the pigmentation of animals on their upper surfaces, that is, the surface exposed to the sun's rays; the occurrence and the effect of sunburn, as well as the germicidal power of the actinic rays, attracted the attention of Finsen, who began to devote nearly the whole of his time to its investigation. He developed his theory that the maturation of the small-pox vesicle is brought about by the presence

of the ultra-violet rays, and proceeded to demonstrate that if these rays were effectually and rigidly excluded, the vesicular eruption dried up without maturing, and without leaving pits or scars, and the sufferer escaped the dangerous secondary fever. The truth, or otherwise, of his conclusions in this matter have been much debated, but he remained a firm and steadfast believer in them, and his reported cases certainly appear to indorse his views.

From this it was an easy transition to the consideration of the effect of sunlight on disease, and Finsen next devoted his attention to the action of the sun's rays on lupus, and found here, too, that it was the ultra-violet rays which produced the effect. He first used concentrated sunlight deprived of its heat rays, but afterwards discarded this in favour of the light of the electric arc. He continued increasing the size and electric capacity of these lamps until he made them of enormous power. The results of his light treatment of lupus are attested by the success of the Finsen Light Institute, at Copenhagen. Treatment by the ultra-violet rays has thus become a recognised therapeutic method.

The future of radiotherapy will, no doubt, witness further developments, and it is probable, to say the least, that other rays may be discovered possessing new properties and powers.

THE VALUE OF X-RAYS IN THE DIAGNOSIS OF THORACIC AFFECTIONS.

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No consulting surgeon of any standing is without his X-ray apparatus, and every day brings forward fresh fields of utility for the skiagram and the screen.

In medicine, however, the position is not so clear. The physician still looks with suspicion upon this intruding stranger amongst diagnostic methods. Failing to realize that the rays come in the guise of an adjunct to existing methods, and not in any way as their supplanter, he condemns them often without trial and rejoices when cases of inaccurate interpretation of Rontgen shadows are brought under his notice.

The general practitioner also is not fully seized with the importance and the value of a careful X-ray examination in many medical cases. On the other hand, he sometimes asks impossibilities of the rays in cases that are quite unsuited for an X-ray examination.

At the outset I wish to emphasize the necessity of obtaining as full a clinical history of each case as is possible before proceeding to make either a screen or a skiagraphic examination.

The X-ray appearances should then be studied carefully in conjunction with the full history of the case, and the clinical signs observed by the usual methods of observation, palpation, percussion, and auscultation. Then, and only then, should a definite opinion as to the nature of a case be given.

As to the relative value of screen or plate, my experience has taught me that both are necessary in all but very obvious cases. With the screen

it is the movements of the organs that are all important, the movements of the diaphragm, the expansion of the thorax in inspiration, the relative movements of the ribs in quiet and deep breathing.

None of this information can be obtained from a plate, however excellent.

On the other hand, the plate is cumulative in its final contrasts between shadow and clear lung, and much information is found to be recorded upon it that is invisible to even the most expert screen examiner.

I always endeavour to spend the fifteen minutes prior to making a screen examination in at least semi-darkness. I have substituted a blue pilot lamp on my switchboard for the usual red. Except when I have the tube in a ray and light-tight box, I prefer to use the fluoroscope to the open screen.

For most chest cases it is better to make the examination in the erect position, although it is often necessary to use the recumbent position in addition, with the tube below the couch. The preliminary examination should be made without the interposition of a diaphragm, so that a general survey of the whole thorax may be made. Having localized the trouble, the diaphragm is very useful to bring up the detail. For screen work, unless the patient is very stout, medium tubes give the most satisfactory screen picture, while for skiagrams the soft tube with heavy currents, is undoubtedly the best.

In screen examinations it is well to adopt a routine procedure in all cases. First, a general examination of the whole thorax, noting the contrast, if any, between the two lungs. First anteriorly, then posteriorly, and finally in the oblique position. Then the condition of the apices—do they clear up equally upon deep inspiration, and, if so, is the lightening up such as one would find in the normal chest. Next, the appearance of the ribs and intercostal spaces should come under observation, and finally the movements of the diaphragm in quiet and in forced respiration. The hands and arms should be extended well over the head to clear the scapulæ away as much as possible.

The most important condition in which the X-rays are of value is in the diagnosis of early phthisis. It is frequently possible to discover the lesions in incipient phthisis before it has been recognised by experienced diagnosticians; but it is quite common to find a well marked lesion in the supposed sound lung, which has been entirely overlooked by the general practitioner. On the other hand, a negative opinion should never be too dogmatically insisted upon. It is quite possible for the expert skiagrapher to miss the early lesions in a case of phthisis by slight errors in technique, and from other reasons which it is unnecessary to specify. In such cases I carefully avoid saying that the patient has *not* got phthisis, but that I am unable to discover anything with the X-rays that would suggest that disease; but that if clinical signs are present and symptoms persist, it would be well to keep under observation for some months, and, if necessary, have a further X-ray examination at a later date.

In any case the appearances go to show that, if present at all, the disease must be in such an incipient stage as to be very amenable to treatment.

In spite of opinions to the contrary, I attach considerable importance in early cases to the restricted or altered movements of the diaphragm.

These altered movements cannot in themselves be regarded as pathognomonic; but in practically all cases of early phthisis that have come

under my observation, I have found them present, and I regard them as an important link in the chain of evidence which goes to make a positive diagnosis in doubtful cases. Unsupported by other evidence, however, I merely look upon them as a sign-post to look more carefully for other things.

I have frequently been asked the question—"How do you distinguish between old healed lesions in the lung and recent consolidation where the disease is active?" There is no doubt that this is a very real difficulty. But when the other clinical signs and symptoms are taken into consideration along with the evidence obtained by the screen and the skiagram, the difficulty no longer obtrudes itself.

Old healed fibrous scars in the lung are denser than recent consolidations, and do not lose any of their density with inspiration; while calcified patches appear as very dense, almost black shadows, with sharp edges.

The diagnosis between early phthisis and enlarged bronchial glands does not, as a rule, present any serious difficulties if the glands are of any size, as they can usually be seen as dense shadows to the right of the sternum. If the glands are tubercular, there is usually some evidence of tubercle in one or other of the apices of the lungs.

If the case be one of pseudo-leukæmia the lungs are, as a rule, clear; while the glands in the neck and axillæ are obviously involved.

The X-ray examination is often of great value in determining the extent of the involvement, and often decides the question of the suitability or otherwise of the case for sanatorium treatment.

My experience goes to confirm the statement that the heart is much smaller than normal in cases of phthisis.

Hydatid of the Lung.—This disease is so frequently situated in the lungs, either as a primary or secondary condition, that it frequently comes under observation by the skiagraphist. The diagnosis of hydatid of the lung is not always easy by the ordinary clinical methods, but hydatids stand out so clearly under the X-rays that all doubt as to their nature is at once removed.

Cases of hæmoptysis, with cough of many years' standing, are frequently diagnosed as phthisis, their real nature only being suspected when the patient expectorates a portion of the membrane of a cyst.

Hydatid of the upper border of the liver, where the cyst projects upwards through the diaphragm, are often easily made out by the screen or skiagram.

Pleurisy with Effusion.—These cases are easy to make out, except in cases where the fluid occupies the whole of one pleural cavity; here the diagnosis from a densely thickened pleura or from a complete fibrosis of the lung presents some difficulties. Alteration of the position of the patient from the erect to the recumbent position will often clear up the former, while in the latter condition the position of the heart is often the solution of the difficulty. In cases of large pleuritic effusion the shadow of the right border of the heart is pushed over well beyond the shadow of the sternum. In fibrosis of the lung, with collapse of the chest wall, the heart is drawn over to the affected side, and the shadow of its right border is not to be seen at all, or to a considerably less extent than normal.

In cases where air is present the picture on the screen is a very interesting one, the top surface of the fluid is cleanly cut and sharply divided from the clear lung above it, and the level alters, or rather does not

alter, with the position of the patient when tilted. In addition, the surface of the fluid shows distinct waves, which ripple away from the heart with each beat.

In pleuritic effusion the ribs are also useful as a means of differential diagnosis. In fibrosis the intercostal spaces are narrowed and the ribs have lost their usual curve and angle with the spine, a condition known as "roof tiling" being produced.

In large effusions the ribs keep their usual angle, and if a sufficiently strong light be used the interspaces are seen to be widened.

Abscess of the Lung.—The X-rays are here very valuable, as they often clear up the diagnosis in clinically obscure cases, and, in addition, enable the surgeon to decide more accurately where to make his incision.

New Growths may be diagnosed from tubercle and pleural effusion; but are liable to be mistaken in some cases for aneurism.

The Heart.—Enlargements and displacements of the heart are easily seen on the screen; but undoubtedly the proper method for the accurate interpretation of the screen shadow is by means of the orthodiascope—an instrument with which I am, unfortunately, as yet unfamiliar.

Pericardial Effusion.—The size and shape of the cardiac shadow is altered, and the pulsations are more or less masked, according to the amount of fluid present.

Aneurism of the Thoracic Aorta.—Thoracic aneurism in all but very stout subjects should be made out by the screen examination in almost its earliest stages.

The difficulty of diagnosis between a saccular aneurism and a uniform dilatation of the aorta is certainly sometimes exceedingly great; but by a careful use of the right anterior oblique position, as described by Holzknecht, I have always been able to give a definite opinion as to the presence or absence of an aneurism.

The presence or absence of pulsation often helps in this respect. Pronounced pulsation is not usually seen in aneurism, but more likely indicates a dilated aorta with aortic insufficiency.

In one case in which I had diagnosed an aneurism of the descending portion of the arch, and where some symptoms which suggested aneurism were present, although the clinical signs were unconvincing, and his medical advisers refused to believe in the presence of an aneurism, the patient, after recovering from most of his symptoms, practically confirmed my diagnosis by dying suddenly shortly afterwards. Unfortunately a *post mortem* was not obtainable.

DISCUSSION ON DR. ARGYLE'S PAPER.

DR. HERSCHEL HARRIS (Sydney).—Dr. Argyle places great stress on the fact that the examiner should be in the room for at least fifteen minutes before making the examination. That is an important point, and should be insisted on in every case. The movement of diaphragm in early phthisis has been very much debated lately. I place a great deal of value on the restrictive movement of the diaphragm. Dr. Argyle concludes that the heart in most cases of phthisis is always small. That has been my experience in the early cases, and in the third stage the heart dilates. I know a good many leading physicians do not agree with that. I must say that in

a number of cases I have seen I have noticed that the heart has been small in the early cases. Referring to hydatids of the lung, I think it is very, very useful to make a skiagram. Very often a surgeon does not go deep enough with the needle to strike them. I consider it advisable always to take a skiagram as well as making a screen examination. I think the second examination is usually sufficient. I had a case where the whole lung was dark on that side, and I thought it was a case of tuberculosis. I had inserted a needle on several occasions and never discovered anything. Later on a larger needle was inserted and pus was drawn off. In a case of that kind, where the whole side is dark, it is very difficult to make a diagnosis. I do not altogether agree that a physician should know altogether too much of a case and then examine it by means of the rays. I think the physician should know as little about a case so that he will not be biased. I have found the skiagram most useful in cases of aneurism, which practitioners would not otherwise be able to diagnose.

DR. DOYLE (Brisbane).—I just wish to ask Dr. Argyle if, in examining cases, he has ever taken into consideration the difference between country cases and town cases. I do not suppose he would see much of the coal-mining cases. The difference is most marked.

DR. CROWLEY (Melbourne).—The only thing I would like to say refers to the diagnosing of early tuberculosis of the lungs. We all know it is extremely difficult for a physician to diagnose phthisis in the early condition. One physician will say that the lungs are sound, while another is doubtful. The experienced radio-photographer tells us he can diagnose early tuberculosis before there are any physical signs, and before any indication can be found in the spittle. Even in some cases the radio-photographers are in doubt. I think that a series of opsonic index determinations taken when a patient was at rest and at exercise are the best diagnostics of every case of phthisis. I only mention this fact because I think opsonic work should be kept up for that one reason; that, so far as I can form an opinion, I am absolutely of opinion that the man who can do the opsonic work properly can give the earliest diagnosis in cases of phthisis.

DR. CLENDINNEN (Melbourne).—The custom at the Melbourne Hospital is that the screen is invariably used. We very rarely take a radiograph for chest affections, because there is more value observed by the screen examination. I just sketch out on rubber stamps what is seen. I quite agree with Dr. Harris the exercising of the diaphragm and balancing of the arms, and the suspicion of the dark shadows in cases of pleurisy from the erect to the recumbent is something you cannot get in radiography. Therefore, we always use the screen in chest affections, unless the physician wishes to have a skiagram. With respect to aneurisms, if you see a small tumour on the left-hand side of the picture in the screen, and it is more prominent in front than behind, you can safely say it is in the ascending part of the aorta. If you find that it is brighter or sharper, and appears on the left-hand side of the chest, you know that it would be in the descending part of the aorta. The shadow generally bears up this way and to the left. I quite agree with Dr. Harris that the erect position is good. We invariably use that position. For these scattered fibrosa in the lung I use the term "marble lung," because it looks like marble. As regards early phthisis—sometimes it is very difficult to say what it is.

DR. ARGYLE (Melbourne).—In regard to Dr. Harris' remarks regarding knowledge of the cases, I do not think he quite understood the attitude I take up. I am quite prepared to make my report on what is seen on the

screen or skiagram without any previous knowledge of the case, but the interpretation of these shades is often absolutely impossible without a clear and defined clinical history of the case can be given. It is necessary to impress upon the physician that the X-rays is an adjunct to his profession, and not a supplanter. I have not had any cases of miners' disease of the lung, and have not noticed any particular difference as regards town *versus* country. I have no personal experience of the opsonic index, but will welcome anything which will help to clear up these early cases of phthisis. Dr. Clendinnen's statement about the use of the screen or plate is interesting. Of course, in hospital practice one is necessarily compelled to depart from the use of the plate or screen, where you are compelled from lack of time to make more exhaustive investigation. In private practice I endeavour to use both the screen and the skiagram.

X-RAYS IN THE TREATMENT OF TUBERCULOUS DISEASES.

T. G. BECKETT, L.R.C.P., &c.

The good results obtained by the application of X-rays in various local tuberculous conditions have been known for a few years; cases of great variety have been from time to time reported, and will be found described in text-books dealing with radiotherapy, but up to the present time the value of these facts is but little known. These cases are generally passed on to the surgeon to deal with, who usually operates if the case is deemed sufficiently serious for anything to be done, and he is perfectly satisfied with this, and to try and convince a surgeon that anything in the world could be better than an operation is a great waste of time. And nowadays there are so many keen surgeons about that any other line of treatment stands but little chance of more than occasional trial with some patient who refuses an operation, or (which I prefer) one who has been operated on a dozen times, for it is with these cases that the most brilliant and striking results can often be obtained with the X-rays. This is the reverse of my experience with malignant disease, where it is quite hopeless to waste time with the X-rays over the derelicts of the surgeon, where no good results can ever be hoped for, but I would advise never giving up a tuberculous case as hopeless, no matter how often it has been operated on. It is a remarkable fact how many times some of these cases are operated on without being any nearer a cure at the twentieth operation than the first. I am not blaming surgery as useless, because in some cases a good result is achieved quite easily with a single operation, also because in many cases an operation of some kind is imperative; but any one who has seen much of operations on such cases must admit a large number of failures, or, rather, many that have to be repeatedly operated on, and all I blame the surgeon for is his blindness in neglecting the aid that X-rays can give in such cases. Biers treatment is meeting with success, because it is being discovered, as if it were a new thing, that something besides surgery may benefit these conditions, and as it has been suggested that its mode of action is probably somewhat similar to X-rays.

It is too early yet to assign reasons at all definite or certain to explain the action of the rays in these cases, but should it come into general use

there will be no difficulty in discovering very good theories to explain the facts. I do not think it is the direct action of the rays on the bacilli that destroys them; probably they could not be administered strong enough for this except in the case of lupus and very superficial lesions; I think even this very doubtful. Experiments have been made in the laboratory with cultivations with contradictory results. It is stated that the tubercle bacilli are easily killed by exposure to light, and if X-rays is a form of light it looks a plausible explanation. Probably we have to thank the light theory for X-rays ever having been tried, the use of the rays having followed as a natural corollary after the success of Finsen's ultra-violet light. On the whole, it looks as if the facts up to the present are against the probability of the bacilli being destroyed directly by the action of the rays. The powers of resistance of tubercle bacilli are unusually great; on the other hand, their cultivation, except in media that just suit them, is not easy. In the human body they are one of the slowest progressing infections almost that we have to deal with, and the longest lasting; the position is similar to that of an invader in a country that is almost able to resist them successfully; the battle may go on slowly for twenty years, and it is only reasonable to imagine that in such a case a very little assistance to the natural resisting powers of the tissues may be sufficient to turn the scale in their favour. That the X-rays do, if pushed far enough, cause an undoubted and visible re-action in the tissues of the body, and to a considerable depth, there is not the slightest doubt; and it is only most reasonable to believe that other changes are also produced, not visible, which may account for the result. The action of X-rays on the blood in leukæmia are undoubted, and have never been explained yet, and there are other physiological changes equally marvellous and unexpected that have already been discovered. I think, if any one chose to take the trouble to investigate the changes in the opinions in a case of tuberculosis under X-ray treatment, that it is very likely that some indications may be detected that would fit in with that theory. It is far more probable to be due to that than any action on the bacilli themselves, because the probability is that an amount of X-rays strong enough to destroy bacilli would be so strong as to seriously injure skin and superficial structure, a danger which has to be most carefully guarded against in this treatment. I think that most authorities are pretty well agreed now that the beneficial action of X-rays, even in lupus, is not due to any bactericidal action of the rays themselves, but to an effect produced very similar to the re-action caused by tuberculin. From my own observation, I have come to the conclusion that the rays, not only in tubercular, but also in other, such as streptococcal and other coccal, infections, aid in the process of immunization of the tissues. This fact, if it can only be established, is of great importance, because if true it means we have in our hands a remedy of great potency in dealing with many and varied local infections.

In the limited time I have at my disposal, the plan I have adopted in dealing with my subject is to take as illustrations the best known forms of local tubercular infections, in the order in which the use of the X-rays has been most common, and its results best known, finishing with those where it has been but little tried, and where for various reasons the prospects of any benefits are not encouraging.

I will commence, therefore, with the treatment of lupus, which is probably one of the oldest conditions that the rays have been tried for. The idea that the rays would be of benefit in these cases was suggested by the success of the Finsen light treatment; therefore it is not at all surprising

that these two distinct methods are still somewhat in the position of rivals, and it is almost impossible to get a fair and impartial comparison between the two; some extremists on both sides will claim the method they work with the best, and that the other is absolutely useless. Sequeira claims to cure about 70 per cent. of lupus with the Finsen light, but he admits that there are some cases that do not do well under it which are curable with the X-rays, and singularly enough his explanation is that these are cases of probably mixed infection—tubercular and coccal. He also admits using largely the X-rays in connexion with the Finsen light. Malcolm Morris also advocates the use of both means, and the truth probably is that each remedy has its own peculiar advantages, and each will sometimes do what cannot be accomplished by the other. For instance, in large ulcerated surfaces the X-rays will soon bring about the healing of the greater portion of the area, and Finsen light can only deal with a non-ulcerating, small, limited surface. Mucous surfaces are better dealt with by the rays. I think the truth is that small patches of lupus can be cured by either, and these make up the large proportion of successful cases, but extensive areas of lupus, especially when they have existed for a length of time, are apt to be cured up to a certain point, and an absolute and complete cure cannot always be arrived at. In the case of X-rays this is due to there being some remaining nodules, which the rays seem unable to destroy unless pushed to a dose of such severity that a severe re-action is produced, and this, whilst removing the nodule, has the advantage of leaving a telangiectasis as an undesirable after result. In a few cases I have been successful in destroying these nodules by the use of the high-frequency spark, followed by a few applications of the rays. It is claimed on behalf of the Finsen light that it does destroy the nodules, hence an ideal line of treatment is to use the rays as far as it will cure, finishing off by destroying the nodule by the Finsen light. The question of the Finsen light or X-rays is not, I think, of much importance out here, because I believe bad cases of lupus vulgaris are comparatively rare. The few I have met with have been easily curable with the X-rays. These photographs will show a few typical cases which I treated with the X-rays, and one in which I failed to effect a complete cure; although nearly cured there were two or three small places that refused to clear up. One class of case that I noticed nearly always gave me much trouble was when the disease was situated on the forehead, and I think the reason is that in such there is probably the element of specific taint; one that gave me a lot of trouble ultimately cleared up by the aid of intramuscular injections of grey oil. Of course, it may be said that such showed it was not a case of lupus, and I must admit I have not always found the diagnosis of lupus easy and indisputable. Also the difference between lupus and rodent ulcer is not always so well marked as to be beyond dispute.

It has been falsely charged against X-rays that its use in lupus is liable to result in epithelioma, but no clear case has ever been proved, and, considering how often the rays are used, it cannot be said to occur any oftener than it used to do, for it is a well-established fact that a small percentage of cases of lupus do ultimately end in epithelioma. Even then the treatment advised is the excision of the malignancy, and the use of the X-rays to the base, and it is hardly likely that would be a good plan if the X-rays had been the cause of it. I do not wish to dispute that malignancy may not develop in a case under treatment by X-rays, but that it is rare; and Sequeira out of a large number of cases recorded says:—"It is generally stated that epithelioma occurs on lupus vulgaris about 2 per cent. of the

cases. Among 964 cases of lupus at the London Hospital there were 14 cases of epithelioma. The proportion is, therefore, 1.5 per cent." This does not indicate any increase of malignancy due to this treatment. A few cases are on record of malignancy occurring after Finsen light treatment, but these are so few in proportion to the number treated that the same argument applies. Nevertheless, the fact that malignancy may occasionally supervene should make us cautious, when using small doses of X-rays for a considerable length of time, such as is sometimes done. It may be taken for granted that if steady improvement does not take place within a reasonable time, it is no use persevering indefinitely with the X-rays alone, but other methods should be tried. Lupus erythematosus is now seldom regarded as a tuberculous lesion, which may explain the fact that most observers have met with little or no success with the X-rays in this condition. My own experience has been distinctly unfavorable so far as X-rays are concerned; it seemed to aggravate the condition in the most surprising manner. The best result I have obtained from any local application was with liquid air. Probably this condition is due to some circulating toxin in the system, which would explain why local applications are so ineffective, and account for the uselessness of X-rays in these cases. One well-marked case brought to me that I remember well, but most fortunately did not treat, developed about two years afterwards epithelioma on one cheek. Had I, unfortunately, treated this case, it might have been credited to the use of the X-rays, which shows how easily these false ideas arise.

In few things are the value of X-rays shown better than in the treatment of tuberculous glands in the neck. I wrote a paper on this subject over four years ago, and subsequent experience has only more strongly confirmed all I said. I think the main cause that prevents the value of this treatment being more commonly known is that these cases are so tempting to the keen surgeon, who is so ubiquitous nowadays, yet I believe few operations are so barren of any real benefit to the patient, putting aside altogether the fact that they frequently recur. The surgeon never pauses to consider that the gland, though enlarged, is simply doing its duty, removing it in no way does anything to cure the tuberculous infection. I believe the old orthodox excuse is that in some way it prevents future tuberculous infection, and possible death from consumption at some future date. It sounds plausible, but as a matter of fact, I have never yet seen a case of phthisis following on enlarged tubercular glands in the neck. I do not say such a case might not possibly be found, but it must be rare, and considering how common these enlarged glands are, I think it is a most striking fact well worthy of investigation. Is it not quite possible that all the time these glands are simply slowly rendering the rest of the body immune to tubercular attacks elsewhere? If so, what earthly benefit does the surgeon confer by removing them. As a matter of fact, if the operation is thoroughly well done, and all the deeper glands removed, I think the patient runs more danger from the surgeon's scalpel than from anything else. I wish I could show you a case brought before me at the Alfred Hospital, about a couple of years ago, where the surgeon in operating (not at that hospital) on some deep glands at the back of the neck unfortunately divided some of the branches of the brachial plexus on both sides, completely paralyzing the elevator muscles of both arms. Text-books on surgery will give you instances of worse disasters than this that have happened from time to time.

In treating these cases by the X-rays, it is advisable to treat for any period from three to twelve months, according to the severity or obstinacy of the case. This does not imply continuous treatment all the time. It is best to begin with as much as the skin will stand, gradually reducing the number of applications, until finally once in every three or four weeks will be sufficient. The fact that this takes some time is seldom any serious drawback. These are not patients that are in any danger. The effect differs considerably. There are two distinct modes in which the rays act, so that cases can be divided into two classes—those that suppurate and those that do not; and this fact leads me to the conclusion that probably the infection is not identical in all cases. It is most likely either two distinct species of tubercle, either bovine or human, or else the infection may be a mixed one. Most likely, in the suppurating cases, streptococci or staphylococci may be present. I find the suppurating are the quickest cured as a rule; the rays seem to hasten the process. A small opening only is necessary to drain out the pus, and very little, or no subsequent, scarring results, nothing like the scars that are left after operating. Cases that do not suppurate take longer. At first, no visible effect on the glands can be detected, but, after two or three months, they will be found to be distinctly smaller, and if the treatment is persevered in they will slowly and gradually disappear, which, in bad cases, may take a year or two. I met with one obstinate case in which a solitary large gland persisted, but it grew no larger, neither did any other glands form. Cases that have existed for twenty years will do well. I remember one young woman that had been operated on seventeen years before, who still had suppurating glands on both sides of the neck, and in one axilla, and was no nearer being cured than when first operated on. She was completely cured by X-rays in twelve months. These glands in the axilla in women are not uncommon, and may give rise to suspicion of malignancy. I remember one case in a woman about 45, which I treated very severely with the rays for a fortnight, and then, as there was room for doubt in the diagnosis, I had a consultation with one of our leading surgeons. He pronounced it malignant, and advised an immediate operation, to which I agreed. This frightened the patient, and she left me, and placed herself in the hands of one of our well-known quacks, who undertook to cure her cancer, which he apparently did, for the intense reaction by the rays brought on suppuration, as it often does, in these cases, the abscess burst, and a speedy cure resulted which was a great triumph for the quack. She has remained perfectly well ever since, which is about three years ago.

The most serious, and often long lasting cases are where the bones, joints, and epiphyses are attacked by tubercular disease. Surgically treated, these cases often go on from one operation to another, and are finally often left uncured. The limb operated on may be healed, and yet you will see the corresponding limb on the other side attacked in a similar manner; or the first operations may be done on the bones of the foot, and the tibia, or knee joint, be ultimately involved. The surgeon, whilst attacking the central focus of the disease, is quite unable to excise the whole area infected, hence the subsequent outbreaks. These operations may be necessary, yet Anthony Bowlby has lately published the result of his experience in dealing with 900 cases of tubercular disease of the hip joint, with a mortality of only 4 per cent., with very few operations, whilst in the cases treated by excision, the mortality reached as high as 40 per cent. I think the results would often be more successful if the X-rays were used for treatment afterwards. I have seen bone cases do well after a

comparatively few exposures to X-rays, some which have been operated on and some without. I have sometimes been surprised at cases that have been submitted to the X-rays, mainly for diagnostic purposes, that have afterwards got well without anything else being done. Emil Beck lately published a series of sinuses and abscess cavities treated by injection of bismuth and vaseline which healed up under the X-rays. Many cases of obstinate sinuses connected with bone have been reported from time to time which have been healed after treatment by X-rays. Although I do not think that every case of this kind would respond to X-rays, yet I think many would do so; that it should always be tried. A series of these cases most instructive has recently been published by Freund, which shows the great value of X-ray treatment of tubercular arthritis. He gives the result of a large number of cases treated by himself, and also recorded by others, which is well worth perusing by any one interested in the subject. A few failures are recorded, but in some of these I think the treatment was not persevered with long enough. Nevertheless, one must be prepared for the fact that, in some cases, no beneficial effect may result. Sometimes a tubercular infection, especially when near the epiphysis, may cause a growth involving the ends of the bone. That is very difficult to diagnose from osteosarcoma. The following skiagram is a good illustration of this condition, and it was operated on by the surgeon, under that impression. Nevertheless, a microscopic examination of the growth by one of our leading pathologists declared it to be a tuberculous growth. A very similar case in a woman which I met with, involving the lower ends of the radius and ulnar, for which a serious operation was contemplated, I treated most successfully with the X-rays. The discharging sinus healed up, the enlargement disappeared, and the appearance of the bones is now perfectly normal. I am inclined to think that some of the cases of sarcoma, reported to have been cured by the X-rays were very possibly tubercular.

There are cases often submitted to the skiagraphist where tubercular disease of a joint is suspected, and which a skiagram discloses nothing. These are cases of neurasthenia. In women it is usually the hip or knee, and in men the knee or ankle. I only mention them because not at all uncommon, and such cases do not do well under X-ray or any other treatment, unless the cause underlying the whole trouble can be reached. Such cases are often sexual perverts, and most difficult to do any good with; but they are not hopeless by any means. Possibly Calmette's reaction may serve to distinguish them from *bonâ fide* tubercular infection; but not always, because there is the possibility of them having some tubercular taint.

In general tuberculosis, such as phthisis, I have used the X-rays in conjunction with other means, such as the high frequency currents and the administration of ozone, with fairly good results in cases that were not advanced. The lungs being fairly transparent to the X-rays, it is not unreasonable to expect to get some effect. A screen examination shows well shadows and patches on the lungs, although I have noticed in cases that have done well under treatment very little visible difference in these appearances. Other observers have noted the same thing. Laryngeal phthisis, apparently, should be very suitable for X-ray treatment, the larynx being so superficial and easily penetrated by the X-rays, and probably if it were the only part involved this might be so; but the disease is not so localized, unfortunately. The infection in these cases is not only widespread, but apparently of a very virulent type, which renders these cases rapidly fatal. I am not aware of any authentic case

of cure or any benefit by the X-rays having been yet recorded in such a case. The same may be said of tuberculous ulcer of the tongue. One case I had apparently did well, the ulcer was excised, and under X-rays healed up without any difficulty. In fact, the patient did so well he would not regard the matter as serious. He went home, and failed to report himself to me again, as I urgently advised him to. He died about ten months after of a rapid form of consumption, both lungs being hopelessly involved. I mention this to illustrate the danger of being misled by the apparently local and limited nature of the infection in these cases.

Tubercular disease of the testicle I have found does well; but here again it should be borne in mind that other parts are infected, the bladder, usually, and possibly the kidneys. The use of the X-rays might, perhaps, be objected to in this region, on account of the danger of causing sterility, which it undoubtedly does; but considering the nature of the disease is so serious that the latest authorities now recommend the excision of both testicles, even when only one is involved, the objection is not worth considering. It should be considered satisfactory to save these glands at all under the circumstances. I noticed a case of tubercular disease of the kidney that had been successfully treated by X-rays a few months ago, and it certainly is well worth trying in this hopeless and serious condition.

In tubercular peritonitis, I have not found the rays of any particular advantage, and these cases do well after laparotomy. The reason is not only is the infection very deep seated, possibly in the pelvis; but also here we have a large quantity of ascetic fluid, an inert dead liquid, in which the bacilli might exist and increase, and which would not be acted upon by the rays in the least, and if my theory of the action of the X-rays is correct, I would not expect the rays to have any effect in such surroundings. The same considerations apply to pleurisy and empyema. The fluid must be evacuated first, and afterwards the X-rays may be used with advantage in these cases. Although some cases of pleurisy recover after simply tapping and draining, yet it must be admitted that many of them do not; but will go on indefinitely, without any improvement for a long time. This has led to the performing of Estlander's operation, and any one who has seen the disfiguring effect of that operation must admit that if anything could be done to avoid it, it would be a blessing to the patient, and I believe most of these cases could be cured with the X-rays after the pleural cavity had been opened and drained. My method of treatment consists in most of these cases in repeated small doses of X-rays three or four times a week, applied to the affected area. By small doses, I mean such as is too small to be measured by any reliable means that we have at present, neither is such necessary. The principle acted upon is to apply the rays, just stopping short of causing any visible reaction, and in long standing cases, it should be carefully borne in mind that even that might be too much if used for many weeks or months. Only experience can guide one in accurately estimating what can be used with advantage. The effect of the X-rays does not tend to diminish by time, but the contrary, and a patient who has been under treatment for several weeks becomes very sensitive to it and much smaller doses are sufficient.

One great advantage in the use of X-rays, especially in the more widely diffused tubercular infections, such as phthisis, is it can be used in conjunction with any other treatment that may be deemed advisable.

DISCUSSION ON DR. BECKETT'S PAPER.

DR. HERSCHIEL HARRIS.—I cannot say that I altogether agree with all that has been said. During ten years I have been doing X-ray work in New South Wales. I have had two big hospitals under my charge, and during the whole of that time I have not treated one tuberculosis case at the Children's Hospital. All the tuberculosis cases are treated surgically, and I must say when any case is referred to me, I always agree, if possible, that it should be treated surgically. A strong point in favour of that is that when tubercular glands of the neck occur, it is very seldom that the case is fitted for X-ray work, therefore it is necessary to have surgical treatment. I am in favour of surgical treatment of tuberculosis cases. Dr. Beckett referred to one of my pictures. I brought it over to get the opinion of some of the people here. The diagnosis was made in Sydney; but I put a big query before it. I am not quite sure what became of the child. The doctor who made the diagnosis said it was sarcoma. I am not at all sure, and would like the opinion of those present.

DR. AYRES (Adelaide).—I would like to mention the fact that all these cases Dr. Beckett speaks of have been most favourably treated. One sees a large number of the glands in the neck treated by the opsonic treatment. Here again Dr. Harris favours treatment by surgery; but I think the treatment by small doses of tuberculin seems to do very well in a large number of cases. A combination of these methods would be better than the treatment, perhaps, by one. For instance, the combination of tuberculin and X-rays in some cases.

DR. ARGYLE (Melbourne).—I have not had much experience in the treatment of tuberculosis with X-rays, and I take up practically the same attitude as I do with regard to diagnostic methods. I think the surgeon and X-rays should work together. The surgeon might remove as much disease as he can; but you must admit that there are cases where small glands are overlooked. I do not agree with Dr. Beckett with regard to his suggested treatment of phthisis or lung cases with the X-rays, because it seems to me valuable time might be lost in treating patients with X-rays for chest affections when they might be on the high road to recovery in sanatoriums.

DR. HERMAN LAWRENCE (Melbourne).—We have not had that great success in cases of lupus vulgaris with the X-rays. I remember one dermatologist in particular saying he doubted a lot of those cases supposed to be cured by X-rays. He offered the opinion that it was almost impossible to eradicate with X-rays; but you could heal them up with the X-rays. With regard to those cases we have heard to-day of lupus, I do not know where they come from. As I said yesterday, in one thousand cases of skin disease I had no case of lupus, and I find very few cases myself of lupus vulgaris in Victoria.

THE PRESIDENT.—My experience is very limited. I have not had much experience in the treatment of X-rays; but, of course, I have had occasional cases. I found that the X-rays in ulcerated forms actually seems to give the best results, and also in the hypertrophic form. In my case I gave a very short exposure, and avoided as far as possible producing any dermatitis. This is important so as not to have the skin broken. In non-ulcerated forms I have been very pleased with the Finsen light. I quite agree with Dr. Harris that all foci in these cases should be dealt with surgically.

DR. BECKETT.—In reply to Dr. Harris, who very ably put the surgical view of the case, I will say that from what I have seen from surgical operations in regard to tuberculosis of various kinds, that the success attained is not as great as when the treatment is in other hands. He must admit that a large number of cases require to be operated on over and over again. Dr. Harris's experience may be more successful than that. I have seen so many cases in which surgical treatment has failed, that I think there is ample room for other treatment to come in. In regard to the treatment of phthisis, I only alluded to it most briefly. I would not recommend it to be tried in a very bad case of phthisis, only in very early cases. I have found it to do very well; but would not allow any patient to run any risk. With regard to lupus, it is rare in Australia, and I fully appreciate the statement of Dr. Lawrence, but in two of the photographs shown I have good reasons for regarding the cases as genuine lupus.

IONS AND ELECTRONS.

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Melbourne.

What is an ion? In the course of a clinical demonstration given recently on the treatment of rodent ulcer by zinc ions, the above question was put to me by several practitioners present.

I propose, therefore, to place before you as briefly and as concisely as possible, a *résumé* of the latest views on the subject of the nature of electricity, and the meaning of such words as ion, electron, corpuscle, as laid down by such physicists as Sir Oliver Lodge, Professor J. J. Thomson, Johnstone Stoney, Fournier, and others.

To begin with, it may be as well to state that there is nothing revolutionary about the electron theory. All the observed phenomena of electricity, with the laws that govern their action, remain intact; nothing is taken away from our knowledge; only a new interpretation of those phenomena and laws has come into being, not suddenly, as may be imagined, but steadily and sedately, after due consideration, and in the fullness of time. As Fournier, in the opening chapter of his work on the electron theory, so beautifully puts it: "No one man can claim the authorship of it. The electron dropped, so to speak, into the supersaturated solution of electrical facts and speculations, and furnished the condensation nucleus required for crystallization. One after another the molecules—the facts of electricity, fell into line, and one department of electrical science after another, crystal on crystal, clicked into its place, dispersion first, then electrolysis, then gas discharges, then radium rays, then metallic conduction, and, lastly, magnetism."

The first definite theory as to the nature of electricity was Franklin's one-fluid theory, which was put forward in 1750.

According to this theory, all matter was permeated by a fluid or electric fire. Any body which contained an excess of this fluid was positively electrified, while bodies which were deficient in the fluid were negatively electrified. This theory did not fit in with the laws of gravitation and cohesion.

and was also at fault in regard to the difference between conductors and insulators. Nine years later, Symmer's two-fluid theory appeared, and was accepted for a time, as it appeared to explain the phenomena of frictional electricity better than Franklin's theory. Symmer's theory held that matter was filled with an electrical fluid which could, by friction, and in other ways, be split up into two equal quantities, which had opposite properties.

The next hundred years produced many new facts and laws, but no additions to the knowledge of the actual nature of the phenomena observed.

The relations between electricity, heat, magnetism, and motion were discovered, but it was not until the close of the nineteenth century that the foundations of the electron theory were laid by Clark Maxwell.

During this period, however, Faraday made his great discovery that in electrolysis the amount of electricity consumed was inversely proportional to the atomic weights of the elements in solution. This discovery must certainly rank as one of the mile-stones in the long road of electrical exploration which lead up to the discovery of the electron.

Forty years later (1873), Clark Maxwell, for the first time, used the term "an atom of electricity," without fully grasping the true significance of the phrase.

Professor Johnstone Stoney, in the following year, explained Faraday's law in words which presupposed the existence of electric atoms, and referred to them as one of the three "fundamental physical units of nature."

At the meeting of the British Association, at Belfast, he used these words: "For each chemical bond which is ruptured within an electrolyte a certain quantity of electricity traverses the electrolyte, which is the same in all cases."

Sir William Crookes was the next great physicist in the field. In 1879, by means of his elaborate experiments on electrical discharges in vacuum tubes, he established the possibility of obtaining matter in a fourth state, which he christened "radiant matter."

But although within a hair's-breadth of the truth, another twenty years had to elapse before Professor J. J. Thomson, of Cambridge, placed the modern electron theory on a sound foundation by measuring the ratio of the electric charge to the mass of the cathode ray particle, or corpuscles, of negative electricity.

In 1888, Herz, of Bonn, discovered that electric impulses travelled through space with the same speed as light, viz., 186,000 miles per second.

From this discovery was born the modern system of wireless telegraphy.

In 1895, Rontgen discovered, or rather hit upon, the X-rays; Bequerel the radiation of uranium; while the Curies searched for and found radium.

By this time, scores of scientists were at work in all parts of the world, and in every case their work focused on the electron, and the electron theory of electricity, with the result that, although much remains to be done, still the electron theory stands clearly enthroned as the latest logical explanation of the true meaning and nature of the substance electricity.

What, then, is an electron?

Sir Oliver Lodge defines an electron as "the unit electric charge or atom of negative electricity," and an ion as "an atom of matter with an unbalanced electric charge, either negative or positive, attached to it: the cause of chemical affinity."

An electron repels another electron, while two pieces of matter attract one another. So far the constitution of an atom has not been discovered, although there are various theories more or less attractive, but purely speculative in character.

As a working hypothesis, however, the best of these theories assumes that an atom of hydrogen consists of an indivisible unit of positive electricity of spherical form within which electrons are revolving.

The force with which one electron repels another is very much greater than the attractive force of gravitation.

It has been calculated by Fournier that if you could place one gramme of pure electricity at each of the poles of the earth, they would repel each other with a force of 192 million tons. He argues from this that in all ordinary electric phenomena the quantities of pure electricity present are very small.

The corpuscle or electron of positive electricity has so far not been isolated, but each atom of matter is held to contain a number of electrons which are not free, but bound down by some force, possibly positive electricity.

In electrolysis each atom temporarily loses an electron or more according to its valency, and is then said to be positively charged. When the atom contains more electrons than usual, it is considered to be negatively charged.

The atom of negative electricity or electron, on the other hand, has been much studied, and is well understood. It has been actually weighed, its numbers counted in a given weight of an element. The speed with which it travels on various conductors accurately estimated. Its size, or rather its relative size, has also been computed.

Lodge writes that "if the earth represented an electron, an atom would occupy a sphere with the sun as centre, and four times the distance of the earth as radius."

An atom of matter may then be compared with our solar system, in which the planets would represent electrons.

An atom of hydrogen would contain 700 electrons, an atom of sodium 15,000, and an atom of mercury over 100,000. *Thomson's Corpuscular Theory of Matter* assumes that all atoms consist of an aggregate of electrons of opposite sign, with one or two which can be detached. The logical sequence of this is naturally the theory of the unification of all matter and its explanation in terms of electricity. The proof of this latter theory is as yet wanting.

Thomson's theory explains chemical combination by assuming that the valency of an element depends upon the number of electrons which can be removed from or attached to an atom of the element in question, by other atoms. The atom which gains an electron is said to be negatively charged by one unit of negative electricity, while the atom which loses an electron, by that loss receives a unit charge of positive electricity. In other words, the old valency bond of the chemist is interpreted by the physicist as an electric tube of force between the two atoms.

It will be at once seen that the electron theory is almost identical with the essentials of Franklin's one-fluid theory, with this important difference, that the nomenclature as to positive and negative charge is reversed. A substance which has received an excess of electrons is now said to be negatively charged, while in Franklin's theory it was said to be positively charged. But as Franklin's terms were chosen quite arbitrarily, the difference is not as important as it might seem at first sight. Franklin might just as well have entitled the electricity obtained from rubbed glass negative as positive.

In order to obtain a clear grasp of the meaning of the electron theory it would, perhaps, be advisable to consider some of the old and well-known electrical phenomena, terms, and laws in the light of the new theory. First, as to the difference between conductors and non-conductors.

Conductors may be solids, liquids, or gases. Solid conductors, usually metals, are thought to be composed of closely-packed atoms with a certain number of free electrons in violent agitation. These electrons are easily interchanged from one atom to another. In a solid non-conductor, on the other hand, the number of free electrons is very small, and they are unable to pass easily from atom to atom.

This method of conduction in solids is often described as the "fire bucket method," in which the atoms represent a chain of men passing buckets (electrons) from hand to hand, the general oscillation resulting in the phenomena which we know as heat.

Fournier, in a very pretty calculation, computes that there are 1,260 million free electrons in a ball of pure copper 2 mm. in diameter, and that for every free electron there are 8 billion combined electrons.

The argument that electricity had no mass because there was no appreciable difference in weight between charged and uncharged bodies is thus disposed of.

We may then picture to ourselves a metallic conductor as a vast course of people packed like herrings in a barrel, with a number of tiny children rushing about hither and thither amongst them, caught and held for an instant, released, bumping up against each other, the speed with which they run about being influenced by the state of the weather, the warmer the day the more rapid the movement.

In copper an electron is said to combine with an atom about 100 million times a second.

We must then think of an electric current as the passage of a vast number of electrons along a wire, but we must also remember that the direction of this "electron current" is from negative to positive, and not, as we have been accustomed to think of it, from positive to negative.

In electrolysis, however, there is a flow in both directions, but here the current is conveyed by ions and not by electrons.

Turning next to conduction in liquids, we find ourselves faced with the familiar phenomena of electrolysis. Here the method of conduction is known as "the bird-seed" method; the bird or ion carries the seed or electron and drops it when it arrives at an electrode.

Pure water does not contain any ions, and is therefore a perfect non-conductor, but as it possesses the power of ionizing other substances to a high degree, it cannot be practically used as an insulator.

It might be supposed that a solution of any substance containing a large number of ions would be a better conductor than a solid piece of wire, but this is not the case. In the metallic conductor the current is due to free electrons, which are very much smaller and more active than the slowly-moving charged atoms or ions in the solution.

The explanation of conduction in rarefied gases in terms of the electron theory is that electrons under the influence of a high electromotive force are hurled violently at an almost incredible speed from one pole of an electric circuit to the other, the gaseous body forming the dielectric between the poles. This method has been described as the "bullet method," and has, perhaps, been more carefully studied than the phenomena of conduction in solids and liquids.

Thanks to the labours of Sir William Crookes and Professor J. J. Thomson, the study of the phenomena of electric conduction in rarefied

gases has probably done more to place the electron theory upon a sound scientific basis of proved facts than the efforts of many other distinguished physicists in other branches of electrical research.

For a gas to conduct an electric current it is necessary that it should be ionized; that is to say, its molecules should be dissociated from one another, and free ions be liberated to carry the charge.

If from any cause the supply of ions of either sign should cease, the gas will no longer conduct, as the supply of each is dependent upon the other.

This is the explanation of the various valve tubes in use, the positive ions being prevented from getting at the cathode, and in this way the current is only able to pass in one direction.

Arrhenius, the great Swedish astronomer and physicist, has applied the electron theory to the consideration of the electrical phenomena of the solar system, and has shown that a constant electrical interchange is always taking place between the sun and the planets.

The sun he regards as having a positive charge, and, therefore, by radiation is constantly expelling atoms or ions of condensed gases, while at the same time it is attracting electrons in vast numbers from the negatively charged planets of the system.

Most of the experimental works carried out at Cambridge has been in the observation of the passage of the slowly moving ions, or positive atoms, rather than the movements of the swift electrons. The positive ions are generally known as "canal rays," or "canal strahlen," and were discovered by Goldstein. They travel with a velocity about 1,000 times less than the electrons; like electrons they can be deflected by a magnet, but not so easily.

Perhaps the most familiar of all electric phenomena is that force which is known by the name of magnetism.

Let us see how magnetism was described by the earlier writers, and then apply the principles of the electron theory in explanation of its mysterious activities.

Nearly all the laws and observations regarding magnetism have been couched in language which accepts as a working hypothesis Symmer's two-fluid theory.

Deschanel, in his treatise on Physics, speaks of imaginary magnetic fluids.

Sir W. Thomson (Lord Kelvin) refers to imaginary magnetic matter of two dissimilar kinds.

Steavenson and Jones, in their text-book on Medical Electricity, published in 1892, refer to magnets as "points charged with a hypothetical something which is called magnetism."

All these vague definitions and mysterious terms disappear when the phenomena of magnetism are explained from the point of view of the electron theory.

The whole thing is explained as the movement of electrons in parallel.

A permanent magnet is one in which the parallelism of the orbits of the revolving electrons is maintained by their mutual attraction.

Early in the nineteenth century, Ampère attempted to explain the action of the magnet by assuming that each molecule of the magnet was surrounded by a mysterious electric current which he was unable to explain. He assumed also that all the currents were revolving in the one direction from left to right. Looked at diagrammatically, a section of a magnet would appear as a number of cubes closely packed together.

The currents in the adjacent sides of each cube would be in opposite directions. These would neutralize each other, except at the two ends or poles of the magnet, which would be free to attract or repel other electrified bodies.

By substituting streams of electrons revolving round the atoms for the mysterious currents, the explanation put forward by Ampère is found to be substantially correct to-day. Not only for magnetism has the electron theory provided a rational explanation of observed facts. The puzzling difficulties of thermo-electricity, the mysteries of radiation and radio-activity, the relations existing between magnetism and light, the true meaning of the forces at work in the galvanic cell, are one and all more or less cleared up when viewed from the stand-point of the electron theory. The scope of this paper does not permit an attempt at any explanation of all these departments of electrical knowledge; but as the voltaic cell is perhaps the best known of all the electric apparatus in daily use in the department of electro-therapeutics, a short description of voltaic electricity from the new point of view is, perhaps, advisable.

Over a hundred years ago Volta discovered that if two pieces of different metals, such as zinc and copper, were placed in contact both metals became more or less electrically charged, the zinc being positive and the copper negative.

This is now understood to mean that electrons have passed over from the zinc to the copper.

Volta also found that metals could be arranged in a definite series so that any metal in the series was electro positive to the next metal beyond it on the series.

This series is now understood to be due to the relative ease with which the various metals part with their electrons; the reason of this varying ability to part with electrons has yet to be found.

In the galvanic cell the process is more complicated. Here we usually have two metals immersed in a liquid solvent and connected externally by a wire.

The solution consists of molecules of water of the salt or acid in solution and ions of its component parts, both positive and negative.

The two metals dissolve in the liquid at speeds which vary with what is known as the "solution pressure" of the particular metal under consideration. The dissolved metal gives up its electrons to the metal itself at different speeds, according to the place the metal occupies in the series, and which varies directly with the solution pressure. The metal with the highest solution pressure will accumulate the greatest number of electrons, with the result that an electrical difference of potential will be set up between the two metals, and a current will flow along the wire. This current consists entirely of electrons, and flows in the opposite direction to that which we have been accustomed to believe takes place outside the galvanic cell.

Inside the cell the positive and negative ions tend to travel towards the plate of the opposite sign. The familiar process of electrolysis taking place.

It is this migration of electrically charged ions from one pole to another through an electrolyte which constitutes the new method of treatment known as ionic medication.

The fact that the human body is an electrolyte, though a complicated one, and that drugs in solution could be introduced through the unbroken skin, was first recognised by Pirvali, of Venice, in 1747, but his work was

not sufficiently trustworthy to be received with any confidence. Similar experiments were carried out by Fabré-Palaprat in 1833, by Hessenstein in 1853, Wiedman in the same year, Richardson in 1859, the latter claiming to have produced local anæsthesia by the introduction of aconite chloroform, which he called voltaic narcotism.

One and all of these early experimenters were received with incredulity, and even marked opposition.

For twenty years after this nothing more was heard of the administration of drugs by electricity or cataphoresis.

In 1884, half-a-dozen experimenters claimed that they had been able to introduce drugs through the unbroken skin, and prove its presence in the urine and saliva.

In 1889, Newman Lawrence and A. Harries read a paper before the Society of Arts in London in which they described the cataphoric method of medication.

In 1890, Thomas Alva Edison read a paper before the International Congress at Berlin in which he claimed to have reduced the size of enlarged gouty joints by the introduction of lithium salts by means of an electric current.

During the next ten years many investigators repeated and confirmed the work done by these early experimenters, but one and all were quite in the dark as to the actual nature of the process and the forces with which they were at work.

It was not until the early years of this century that the new discoveries in physical science, and more particularly in electro-chemistry, enabled Leduc, in France, and Lewis Jones, in England, to place the method of ionic medication, as it is now called, upon a sound and scientific basis.

Leduc, in his monograph on the subject published this year, sums up his views on the action of ions upon the human body as follows:—"The actions of ions," he states, "indicate their variety; actions which may be caustic in different degrees—antiseptic, coagulating, producing vascular changes, and modifications of sensibility, conductivity, vitality, &c. All these actions are capable of practical application. It is indisputable that the electric current in living tissues, as in all electrolytes, is nothing else than the double current of ions. The effects of the current are only the effects of the ions. They vary considerably from one ion to the other; the current, or the E.M.F., is only the force which drives the ions into the tissues."

Lewis Jones, in a paper read before the Electro-Therapeutical Section of the Royal Society of Medicine, at its meeting this year, shows that by studying the laws that govern the behaviour of solutions in which electric currents are passing, it is possible to definitely and accurately calculate the actual amount of any substance set at liberty by the passage of an electric current of known strength for a specific amount of time.

He also showed that it is possible to compute with a fair amount of exactness the depth to which a drug can be made to penetrate into the tissues, the complexity of the electrolyte being the only bar to absolute accuracy.

The quantity of metallic zinc driven into the tissues by a current of 10 milliamperes for fifteen minutes was calculated to be 3 milligrammes.

That ions do penetrate very rapidly into the tissues I have personally proved by finding free iodine present on the saliva of a patient into whose pleura I was driving iodine ions from a solution of sodium iodide, applied to the outside of the thorax upon electrodes connected with the negative pole of a battery, and with a current strength of from 50 to 100 m.a.

Critics of this new method for the local application of drugs for the cure of local conditions frequently ask the question: "Why go to the trouble of using all this electric paraphernalia when a hypodermic syringe will introduce the same drug without any trouble at all?"

Leduc answers this query by stating that it is doubtful if the effects of treatment by ions are the same as when drugs are introduced orally or subcutaneously. In ionic medication, the ions of the drugs are substituted for the ions of the organism, and often combine locally with the organic salts present. In the other way, the drugs are added to the existing ions, and are not fixed in the tissues, but are rapidly carried off by the lymph and blood streams.

Lewis Jones considers that the anæsthetic effect of cocain and adrenalin is more lasting when introduced by the electric current than when injected hypodermically, although the actual quantities of the drug introduced is considerably less in the former method than in the latter.

Lewis Jones also is of opinion that by the use of larger currents for longer times of application, under local or general anæsthesia, more striking and rapid results will be obtained by this method.

Rodent ulcer, lupus, ringworm, rheumatoid arthritis, gout, both acute and chronic, and many skin afflictions are all being treated by this method, and in many instances the results have been encouraging to say the least of it. Time alone will show if any decided improvement upon older methods has been arrived at.

In conclusion, my apologies are offered for the incomplete and scrappy manner in which I have been compelled to place these few facts before you. The subject is so vast that any one division of it would require almost a volume to do it justice. Many of the hypotheses put forward here are as yet unproven, while others are in the nebular stage, and extremely difficult to express in simple language. But the significance of the new theory of electricity must be apparent to any student of its fascinating possibilities.

Its twin sister is the corpuscular theory of matter, and their sequel may be the unravelling of the mystery of the universe.

My excuse for bringing forward this crude attempt at an explanation of the new ideas as to the nature of electricity, and the electron, is the absence of all reference to the theory in the latest text-books on medical electricity, and the fact that very many of our brother practitioners are quite unaware of the advances that have so recently taken place in the knowledge of electrical science.

DISCUSSION ON DR. ARGYLE'S PAPER.

Dr. HARRIS (Sydney).—We know now that the chemical action of certain drugs, and consequently their additional value, depends entirely upon the actions of their ions. I do not think Dr. Argyle mentioned that the derivation of ions comes from the Latin for "travellers." There are certain things used in medicines, such as glycerine and vaseline, which are not electrolytic; they do not disassociate ions, and this accounts for the appearance of certain opposite effects. A good example is carbolic acid. It is possible to drink a teaspoonful of carbolic mixed with these without any ill effect, but we all know it would not be possible to do so with the carbolic alone. In using the ions, I do not think Dr. Argyle mentioned that





MOLLUSCUM FIBROSUM.

MR. A. W. F. NOYES' CASE.

the metals and electrolytes have to be introduced by the positive poles, and the non-conductive electrolytes have to be introduced by the negative poles.

DR. ARGYLE.—I would just like to thank Dr. Harris for reminding me of certain things. The use of ions quite apart from electricity is hardly recognised by the profession, but it will have to be recognised. In all solutions, no matter what they are, the drug which is in solution is in the course of ionising. More will come of this in the future, and I am quite satisfied that ions will become familiar. With regard to Dr. Doyle's question, cataphoresis was the name given for the introduction of a drug by electricity. The difference between cataphoresis and ionisation is only one of degree.

DEMONSTRATIONS.

SECTION FOR DISEASES OF THE SKIN, ETC.

One morning was devoted to the Demonstration of Skin Affections in Living Subjects by lantern slides, microscopic sections, and moulages; also cases illustrating the effects of treatment by liquid air and carbonic snow.

DR. WETTENHALL gave a lantern demonstration of some microphotographs, including *Acne Scrofulosorum*, showing characteristic pustule with oedema and infiltration of surrounding tissues.

Mycosis Fungoides, showing greatly elongated interpapillary processes and masses of new cells in papillæ and corium.

Lichen Planus Bullosus.—Section through a bulla.

Lymphangionia Circumscriptum, with vesicles in the true skin and enlarged lymph spaces in various parts of the section.

Hidradenitis (Folliclis), showing a chronic type of infiltration round the sweat glands.

Pityriasis Rubra Pilaris, with heaping up of horny layer blocking the hair follicle.

Variola, confluent form during pustular stage, X-ray dermatites—one section showing cornification to excess—the other the downgrowth of epidermis into the tissues beneath.

DR. NOYES showed through the lantern illustrations of many rare skin affections, with their histopathology. He showed several cases of advanced *Molluscum Fibrosum* in the living subject, and by the aid of microscopic sections thrown on to the screen through the lantern he demonstrated the origin of these growths in the proliferating eudoneurium of minute nerve tufts, the growths being really neurofibromata.

The following is the history, with a plate of the most marked of these cases, in which the large pendulous masses may be traced up from the minute split-pea sized bluish discolourations on the surface and the small elevations—the earliest clinical evidence of the growths.

A.B., æt. 33, male.

The condition commenced as far back as the patient's recollection goes. Fresh growths have appeared from time to time, and the large pendulous one on the arm (*vide* illustration) has increased much in size of late years. This growth is on the right arm. It extends from about half-way up the forearm, involving the elbow, to the shoulder; it surrounds the limb, being

thrown into folds along the upper surface, hanging down about 18 inches in a baggy mass. Three deep furrows extend from top to bottom of the mass. The surface of the skin is coarse-looking, with orange, rind-like depression, due to enlarged opening of pilo-sebaceous follicles.

The surface sensibility is much altered; the patient cannot feel a test tube filled with boiling water. Some few months ago, the fold of new growth rolled against a hot iron. He did not attempt to move, and only remembered the incident when he subsequently saw the considerable amount of damage done to the tissues. A pin may be driven in an inch without being felt.

Smaller hen's egg sized growths exist in other parts, one on the right forearm and one on the occipital region.

Smaller ones still may be seen, and they may be traced by gradation down to the small bluish discolourations in the skin. This bluish tinge in the skin is the first evidence of the large majority of growths. Split-pea in size, at first it enlarges, and gradually becomes raised above the surface. A broad attachment may exist if the growth may arise more abruptly from the surface, giving the appearance and puffy feel of a female nipple.

The tip of the finger pressed into the early manifestations of the growth sinks into a distinct depression.

A peculiar growth of coarse hair exists over the right forearm, shoulder, pectoral, and scapular regions on the side on which the large pendulous growth exists.

This case is full of interest as showing the size which may be attained by growths which, as was demonstrated by the author of this clinical record in the *Journal of Pathology and Bacteriology*, December, 1903, originate by proliferation of the eudoneurim in the minute nerve tufts.

DEMONSTRATIONS AND EXHIBITS.

DR. CLENDINNEN projected on the screen about fifty Rontgenographs of various diseases of the bones, *e.g.*, Osteo sarcoma, Osteomyelitis, Ostitis, periostitis, osteomata, tubercular hip, tubercular and syphilitic dactylitis, bone cyst, arthritis deformans, traumatic atrophy of the shoulder joint, myositis ossificans, Microdactylia, chondromata, acromegaly.

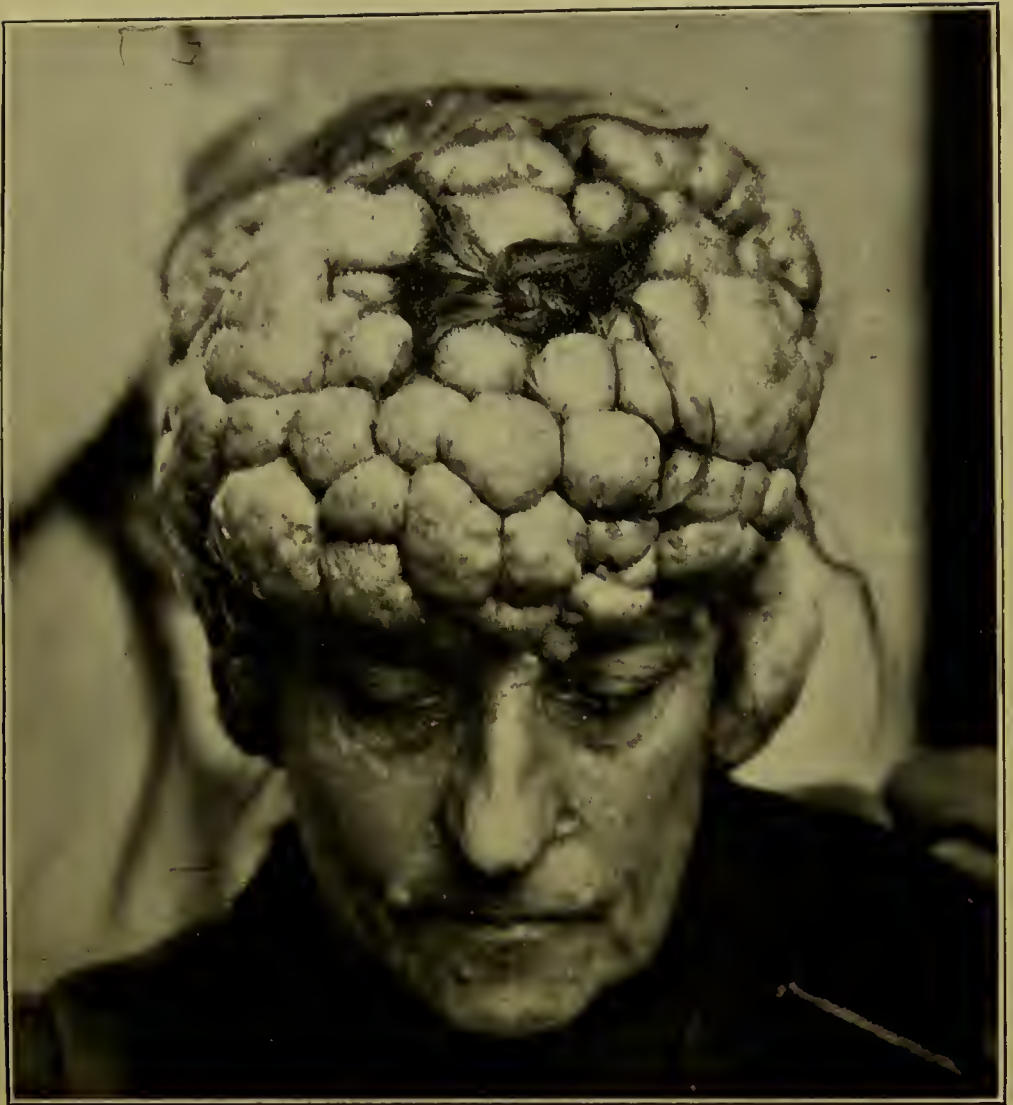
In addition to the above, a large number of coloured lantern slides of cases taken before and after treatment were exhibited on the screen, *e.g.*, epithelioma, rodent ulcers, nævi, lupus vulgaris and erythematodes, alopecia areata, cured with the ultra violet rays.

A demonstration was given by Dr. Clendinnen with the oscillograph and oscilloscope.

This instrument showed how the current was rectified by the Villard tube, and also how the current was affected by the intervention of a spark gap in the secondary circuit.

The various curves produced by the different brakes were also demonstrated.

DR. HERMAN LAWRENCE exhibited moulages of some rare skin diseases, including a case of cylindromata, and a case of colloid degeneration of the skin.



CYLINDROMA.

MR. HERMAN LAWRENCE'S CASE.

Patient states condition began in early life and slowly increased. No trouble except unsightly appearance. Her mother was also under Mr. Lawrence's observation with similar condition. Tumors bleed freely if incised. Moulage may be seen at Pathological Museum, Melbourne University.



COLLOID DEGENERATION² OF SKIN.

MR. HERMAN LAWRENCE'S CASE.

Patient, *æt.* 36, has always lived in country and hands have been freely exposed. Disease began many years ago on dorsum of both hands and spread gradually. Histologically condition conforms to colloid degeneration. Montage may be seen at Pathological Museum, Melbourne University.



DERMANYSUS (AUSTRALIS).

MR. HERMAN LAWRENCE.

Detected as cause of skin eruption in several patients. Rash suggestive of scabies but without burrows. Parasite usually in underclothing. Size about twice that of *Acarus Scabei*. In one case, a medical man, no parasite was found, but patient brought a number next day discovered by himself on his sponge. Parasite shown to dermatologists in Paris, London, and America, but not recognised. Mr. Lawrence considers it peculiar to Melbourne.

In the case of cylindromata, the head was covered with tumours, varying in size from a filbert nut to that of a good sized tomato. Microscopically, the tumours were found to be of an alveolar epitheliomatous structure.

The moulage of colloid degeneration of the skin depicted lemon-coloured, waxy, semi-translucent papules upon the dorsal surface of either hand. There were a few similar patches upon the cheeks.

Moulages of cases of lupus vulgaris, angiomaticous nævi, rodent ulcer, and other skin diseases, which showed the results obtained in these cases which had been treated by liquid air, carbonic snow, radium, or the Finsen light; also moulages showing the good results obtained in the treatment of some diseases of the nails by radio-therapy.

DR. CLENDINNEN then exhibited a number of lantern slides on subjects he had worked with radiography.

DR. HERSCHELL HARRIS (Sydney) said.—I wish to congratulate Dr. Clendinnen on the excellent slides he has shown us to-day. Nobody has any idea what an immense amount of labour it takes to prepare slides until they do it themselves. Often it takes only a few minutes to show, whereas it has taken hours, days, and weeks to prepare them. It is sometimes a matter of many days to prepare even one; sometimes a dozen have to be made before one is perfect. As is usual in other spheres of life, pioneers seldom get credit for the work they have done, but Dr. Clendinnen is entitled to great credit for his early efforts in the practice of radiography.

EXHIBITS.

DR. L. HERSCHELL HARRIS (Sydney) exhibited about fifty Roentgenographs of renal calculi with the calculi attached, also some plactic Roentgenographs.

DR. F. J. CLENDINNEN exhibited plastic Roentgenographs of fractures of bones.

DR. S. ARGYLE exhibited Monell's localizer and Bordier's radiometer.

DR. W. R. FOX exhibited a radiograph taken with carnatite (a radio active mineral found in South Australia).

SECTION OF NEUROLOGY AND PSYCHIATRY.

PRESIDENT'S ADDRESS.

By ERIC SINCLAIR, M.D.,

Inspector-General of the Insane, New South Wales.

I have to congratulate you on again forming an independent section of Psychiatry, and that the term Neurology is allied with it. In the second Congress in Melbourne there was a section of Psychology under the presidency of the late Dr. Manning, but in the succeeding Congresses our subject has been merged with that of State Medicine. I trust that you

will be able to demonstrate that the placing of it on an independent footing is justified both in the number of papers and in the quality of the work undertaken. The programme before us fortunately promises well, thanks in the main to our energetic Secretary, and I trust that it will afford us opportunities for instruction and interest.

In seeking a subject for the address from the chair, it occurred to me that there is no readily available comparison of the conditions, legal and medical, connected with the administration of Lunacy in Australia, and, as it seemed probable that this might prove of sufficient interest, I have prepared a statement dealing with them. The general principles on which Hospitals for the Insane are established, and on which the various Lunacy statutes are based, are largely similar, not only in the Australian States, but in most English-speaking countries, but there are local variations, and the following general statement shows the provisions necessary in these States for the admission and discharge of patients, the establishment of hospitals and licensed houses, the details of administration, and the more recent methods adopted in dealing with the acute insane. I will endeavour not to weary you with too much technical or legal detail, and will, therefore, ask for your forbearance if the statements made are occasionally wanting in elaboration.

Admissions.—Admissions to Hospitals for the Insane in most of the Australian States are by (a) a magistrate's order, or (b) a request by friends, two medical certificates and a statement of particulars accompanying the papers in each instance. With the exception of criminal patients, for whom there is a special procedure, the only other method of admission is by the order of a Judge of the Supreme Court, or of the Committee appointed by it, where the patient has been declared insane by the Court. This latter, however, does not obtain in South Australia.

Admission on Magistrate's Order.—The magistrate's order requires to be signed by two justices of the peace, or by a police magistrate, who in most States carries the same authority as two justices. In South Australia, however, one justice may order a pauper patient's admission, unless there is a charge of neglect or cruel treatment, when a second justice is to be called in. In this State also, and in Tasmania, one medical certificate is sufficient to support the magistrate's order.

Before the magistrate can make the order, it must be shown that the patient is not only insane, but that other conditions also exist, such as, that he was found wandering at large, or was not under proper care and control, or was cruelly treated or neglected by those in charge of him, or was without sufficient means of support, or was about to commit an offence against the law, it apparently being intended that the order should be used only for cases where there is some condition affecting the public interest besides the insanity itself, the other cases being admitted on the request of their friends. With insane patients whose conditions require treatment in a hospital for the insane, one or other of these qualifications usually exists, and there is but little difficulty, therefore, in dealing with them by this method. The order does not require other evidence beyond the two medical certificates, but in the discretion of the magistrate it may be received, and in most instances the depositions of the arresting constable or of those who brought the patient to the police are obtained. The magistrate's order is for admission to a hospital for the insane, but in New South Wales and Tasmania it may also be addressed to a licensed house; in the other States admission to a licensed house is by request only.

Orders in Private Houses.—The magistrate is also empowered to deal with cases in a private house or at any other convenient place, instead of bringing the patient to the Court, but in these cases he is required in some States to send in a formal report of having done so. This provision is infrequently availed of, probably only when a patient is physically unfit to be brought to the Court, which cases it was doubtless originally intended to meet.

Duration of Order.—The period for which the order remains in force before admission varies in the different States: New South Wales and Western Australia specifying 28 days, and Queensland 40, while Victoria, South Australia, and Tasmania, do not specify the period. The time is counted from the date on which the certificates are signed, and not that of the order. The magistrate in New South Wales and Queensland is authorized to direct the patient's admission into a reception house, hospital, or gaol for immediate treatment, or pending his removal to a hospital for the insane after the order, statement, and certificates have been properly filled in and signed, and for this purpose he is authorized to issue a special warrant on the reception house, usually termed an emergency warrant. Where a second medical certificate cannot readily be obtained, the order may be made on one certificate only, provided the second one is secured in the reception house. In this case, the emergency warrant requires to be signed by two justices. In South Australia, however, private patients may be admitted to the hospital itself on one certificate, there being no provision for a reception house in that State, but two additional certificates must be obtained within three days of the admission of the patient.

Admission by Request of Friends.—The second method of admission is by means of a request signed by a friend, relative, or guardian. This is intended to be used where the patient is in a position to have his disease dealt with as a medical factor, apart from its effect on the public welfare, or where he or his friends are able themselves to make the necessary arrangements for treatment. In this instance, two medical certificates are required to support the document in all the States, though in Tasmania the patient may be admitted on one certificate, provided the second is obtained within fourteen days of admission. The period for which the request is available after signature varies in the different States, the date from which it is counted being, as with the order, that of the certificates, and not of the request. This time is seven days in South Australia and Victoria, ten days in New South Wales, Western Australia, and Tasmania, and fourteen days in Queensland.

Statement of Particulars.—With both the order and the request, a statement of particulars of the patient's name, age, birthplace, previous attacks, &c., &c., requires to be attached to the papers.

Medical Certificates.—As to the medical certificates themselves, all the States carefully guard against these being improperly given. The patients must be separately examined by the practitioners, and the certificates must be in two parts—the facts observed by himself, and those communicated by others, and must contain sufficient evidence in the facts observed by the practitioner himself for the detention of the patient. No patient can be admitted on the second part of the certificate alone. The practitioners must not be related, either personally or in business, and they must not have any connexion with the institution to which the patient is going, with the superintendent, or professionally attend a patient there. They must be registered in the State in which the hospital is situated:

South Australian Patients.—In South Australia, the procedure in regard to admission is somewhat different from that described as applying

to the rest of Australia. In this State, if the patient is a pauper, one justice of the peace may give an order on one medical certificate, and the patient need only be insane, and a proper person to be taken charge of, and detained under care and treatment, without the qualifications required by other States. If he is not a pauper, one justice, with one medical certificate, may still order his admission if it is also found that he is wandering at large; but if he is insane, and not under proper care and control, or is cruelly treated or neglected, two justices must adjudicate before the order can be made out. If he is a private patient, with relatives able to deal with his case, he may be admitted on the request of a relative or friend with one medical certificate. If the patient is dangerous or criminal, two magistrates may make the order on two medical certificates, or if no medical certificate is obtained, the order may still be made out "on other sufficient proof."

Comments on Admission through Police.—As a rule, patients for whom an order is sought are dealt with in the Police Court in a manner which differs from the ordinary offenders, who are there for trial only by the courtesy of the magistrate in securing some privacy for them. In Victoria this privacy is provided by Act. The procedure necessarily involves a certain amount of publicity, and all the disadvantages to the patient consequent on his insanity being treated as a legal offence, and, although perhaps there is no other method readily available at the present time, it by no means commends itself to the medical mind as a proper way of dealing with the disease. Efforts must, therefore, be sustained until some process is found by which the Police Court procedure can be altogether avoided.

As an endeavour to diminish this evil, the Court in Sydney and in Newcastle, in New South Wales, is held in the reception house, one of the rooms there having been gazetted as a Police Court. The room set apart is the visiting room of the institution, and, being furnished for this purpose, has none of the suggestions of a court. Although this minimizes the evil, it cannot altogether remove the impression from the patient's mind that he is a prisoner, and that his insanity is looked on as a crime, and in any case it does not deal with all the admissions. In the country towns, and in the suburbs of Sydney, which are too distant for patients to be sent to the reception house, the procedure in open court has still to be followed, and, although by the arrangement described about half of the cases admitted to New South Wales hospitals are saved Police Court publicity, the other half do not benefit by the endeavour.

That the greater number of patients are sent to hospital on a magistrate's order is perhaps to be expected in a thinly populated country like Australia. Where the hospitals are in the neighbourhood of cities, patients may be brought to them direct by their friends, but in the country the expense of travelling and of conveying cases long distances prohibits any but those who are well-to-do from undertaking this duty. No alternative therefore exists in most cases but to seek the aid of the police, who will obtain the necessary certificates and order, and provide an escort to the nearest hospital. All of us as medical men doubtless deplore the necessity for this procedure, but until the country becomes more settled it is difficult to see how it can be avoided. Reception houses cannot be multiplied indefinitely, as they can only be maintained economically in the larger towns. In those of less size, the institution and its staff would be unoccupied for considerable periods of the year, and the expense of providing a sufficient

number of them to avoid the use of the court and of police would be so considerable that it can hardly be justified with the present limited population.

It might, perhaps, make this clearer if the figures showing the numbers of patients under observation in the gaols in the larger country towns of New South Wales, during 1907, are stated. In Goulburn, there were 33; in Deniliquin, 19; in Broken Hill, 18; in Bathurst, 14; in Albury, 10; in Cooma, 10. In all the others, the numbers were less, and of the total number dealt with in the State, one in every four only was certified and sent to a hospital for the insane, the others being discharged. The average length of stay of the patients in these country gaols is from seven to ten days, and it is obvious that in one case only, that of Goulburn, would the institution be occupied during the whole of the year.

Perhaps the most easily available remedy would be for the country hospitals to open their doors to insane patients. In Victoria, something has been done in this direction, and in Western Australia arrangements are being made to attach mental hospitals to some of these hospitals. In New South Wales, however, any approaches which have been made to these institutions have been met with refusal, and in none of the hospitals are insane patients, as such, admitted for treatment. A considerable proportion of the patients could be treated without difficulty in the local hospitals, if not until the termination of the illness, at any rate at the beginning, and until certificates have been signed. Where a patient is maniacal, or dangerous, it might be necessary to use an isolation room, but in most cases this would not be required, delusional cases, dements, and suicidal patients being suitable for the wards for the short time they would be there. The institution might be subsidized by the State paying the expense of any extra nursing assistance required. Even this inducement, however, has not been sufficient to overcome the reluctance of the hospitals to undertake the care of insane patients. It is surely an anomalous state of affairs that while those in charge of mental hospitals, and interested in improving the condition of the insane, should be straining every endeavour to remove the feeling in the community against insane patients, so that they may be looked on as suffering from an illness, which only differs from that of other sick in the organ which is attacked, those responsible for general hospitals should stand aloof, and by refusing to assist in the endeavour should perpetuate the mediæval idea of the mentally afflicted being a class from their fellows.

Reception Houses.—Reception houses are provided for in the statutes of all the States except South Australia and Tasmania. In this direction, New South Wales was the pioneer, and a meed of praise is due to the late Dr. Manning for his services in establishing and maintaining the reception house in Sydney, which has for so many years served as an object lesson to demonstrate the usefulness of such an institution. Two classes of patients admitted to the reception house, viz., those in whose cases the insanity has not yet been decided, but who have been brought before a magistrate as deemed to be insane, and those whose insanity has already been determined, and for whom the complete papers for admission to hospital for the insane, order or request, certificates and statement, have been made out. In the first case, the magistrate has authority to remand the patient to the reception house for a certain period, and to repeat this from time to time as may be necessary. In the second, the justices issue a special warrant, which, with the papers for the hospital, accompanies the patient to the reception house.

It is thus clear that the primary objects of the reception house are to deal with cases which have not yet been certified, and in which there is need of observation as to whether the patient is actually insane, or has a prospect of recovery without the necessity of proceeding to a hospital, and to afford a resting place for patients on their way to a hospital, and for whom the proper papers have already been prepared, and not to act as a mental hospital for the acute insane.

It is customary to send on at once those patients whose papers are made out for a hospital, unless they are found to be convalescent, when they are, of course, retained and discharged, the discharge order being signed by a justice of the peace on the certificate of the medical officer. The reception house may receive patients for whom the order or request has been signed with one medical certificate only, this being intended to meet cases so urgent that a second certificate cannot readily be obtained; but in these cases the order for admission to the reception house must be signed by two justices, and the second certificate must be secured before the patient is sent on to the hospital.

The reception house may, without invalidating the order for admission to a hospital, detain cases in transit for a period of fourteen days in New South Wales and Western Australia, and of thirty days in Queensland; or, if the medical officer certifies that the patient is not fit to be moved, or will be benefited by further detention, until he certifies that he is so fit. In Queensland, the period may be extended from time to time by two justices for seven days at a time.

In Victoria, the arrangements by which patients are admitted are somewhat more liberal, and the period for which they can be detained is extended. A case can be received in three ways:—(1) By a justice's order, with one certificate from a medical practitioner, he may be detained for seven days; or (2) by an order signed by two justices he may be admitted for the same period, which can be extended to a maximum of two months by seven days at a time; or (3) with a request form of admission, supported by two certificates and the statement of particulars, he may be received for one month, and detained for another month on the authority of the Inspector-General of the Insane and an Official Visitor. In the first two instances, when ultimately certified, the patient is sent to a hospital on the usual magistrate's order. In the request form of admission, the patient is to be examined by the Superintendent, and if not found insane discharged. If found insane he is to be forwarded to a hospital, and the Superintendent's order, with a copy of the papers with which he was received, are to be sufficient authority for his admission to the hospital.

In New South Wales no patient is to be sent to a reception house who has previously been detained in gaol for an offence, and in Victoria no person who is under arrest, or likely to be charged with an offence. These provisions are intended to prevent it being used by the chronic drunkards who haunt the police courts, and suffer from frequently recurring attacks of *delirium tremens*.

Reception Cells.—With reception houses are bracketed public hospitals and gaols so that the benefits of residence in a reception house may be obtained in country towns; but these are not utilized to any great extent, except, perhaps, in Victoria, where, in some towns, reception wards are maintained in connexion with the hospitals. The gaols are, however, largely availed of, as indeed they must be, in the absence of other more suitable provision. While the necessity for so using them is obvious, the objection to their use, because of the associations and the depressing effect

on the patient's mind, is equally obvious, and has already been referred to. In New South Wales the prison authorities have arranged that in the prisons made use of in this way a cell is gazetted as a reception house under the Lunacy Act, the object aimed at being to mitigate as far as possible the effect on the patient's mind of being described as having been committed to gaol. The names of those received in these reception cells are not placed on the official register of the prisons, and they are attended by special attendants or nurses, who are engaged for each case under the direction of the medical officer of the gaol and are paid for by the Lunacy Department. There is not a great deal in this scheme to commend itself, beyond the recognition of the fact that insane patients should be provided for otherwise than in gaols, and its recognition of the necessity for being constantly on the look-out for some improved method of dealing with them.

Voluntary Patients.—Only one State, Western Australia, has, so far, obtained permission to admit voluntary patients. In this instance, the patient requires to make personal application to two justices, who may then give consent for his admission, for a fixed period, to a hospital for the insane, on the expiration of which he is discharged, but it may be extended from time to time by application to the justices. Should the patient desire to leave the hospital he must give 24 hours' notice. This is made to apply equally to licensed houses and to hospitals for the insane. It is hoped that this example may be followed in the other States, and, as far as New South Wales is concerned, an amendment has been for a considerable time under consideration to provide similar facilities. Although the exact procedure would be somewhat different, the principles governing the case would be similar. The patient should himself make application either personally or in writing. He should be able to leave the hospital when he so desires, but sufficient notice should be required, so that in the event of his being unfit for liberty there would be ample time for proper action to be taken either by the authorities or by his friends, and for this a longer period than 24 hours seems necessary. Voluntary patients also should be seen at each visit of the Inspector-General or Official Visitor.

Amendment of Papers.—In all the States but Tasmania it is provided that admission papers, if incorrect or defective, may be amended within a period varying from 14 to 28 days, or, as in Western Australia, at any time. The amendments must be approved by the Inspector-General, the Minister, or an official visitor, as may be, according to the State. In Victoria amendments may also be made by direction of the Supreme Court at any time when proceedings in a case are being taken before it.

Examination of Patients.—On the admission of the patient into the hospital, some of the States require that a certificate, intimating the patient's mental condition, should be given by the medical superintendent between the second and the seventh day after admission. This certificate is to be forwarded to the head of the Department, the Inspector-General, or the Minister, as the case may be. In South Australia the examination is to be made within 48 hours, but no certificate is required. In Victoria each patient is to be examined annually for the first three years, and at five yearly intervals afterwards by the medical superintendent, or a medical officer of the Department specially appointed for the purpose, or in licensed houses by the Government medical officer. The direction to examine and report within a short period of admission is undoubtedly a good one, and the arrangement by which the report is

sent in, not before the second, and not after the seventh day, gives sufficient latitude for determination in cases where there is difficulty in arriving at a diagnosis, and at the same time removes the risk of the discharge of an insane or dangerous patient because of insufficient observation. It also provides for the medical superintendent becoming personally acquainted with the case of each new patient. The re-examination of old cases at fixed intervals, as is done in Victoria, is also to be commended, so long as it is not made too frequently. The amount of labour involved in such an examination in a large hospital is so great, that it is liable to be performed in a hurried, or routine manner, and so be deprived of its full value as a means of discovering whether patients are being overlooked, if the re-examinations come too quickly after each other.

Court Patients.—In most of the States the Lunacy Acts deal with the methods of declaring a patient insane and incapable of managing his affairs, and for appointing committees of his estate and person. It is also arranged that on his recovery the Court may declare that he has recovered his sanity, and may discharge these committees. These provisions correspond to the well-known *inquisition de lunatico inquirendo*, and provide means of conserving and administering a patient's property where he is likely to be permanently insane. In New South Wales and Western Australia there is an additional section by which persons may be declared incapable of managing their affairs, from mental infirmity, arising from disease or age, and in these cases a committee of the estate alone is appointed, and not of the person. This has proved a valuable addition to the law, and enables many persons to take advantage of the protection of the Court who are not so insane as to make it possible for them to be declared so in a formal way. It is, at the same time, less hurtful to the feelings of the patient and his friends that in slight cases he should be declared incapable rather than insane. There is also provision for the appointment of a Court visitor, who may be the Inspector-General of the Insane, and who is directed to visit and report, through the Master in Lunacy, the condition of the patients and their homes.

Recapture of Escaped Patients.—Considerable powers of recapturing escaped patients are given in all the States. In South Australia the time in which this may be done is limited to 14 days, in New South Wales to 28 days, in Victoria and Tasmania to three months, but in other States the time is not fixed, so that the patient may be brought back at any time if he is still insane. Criminal patients may, however, be recaptured in all the States at any time.

Transfers.—Once admitted, patients may be transferred from one hospital to another by an order from the Minister in charge of the Department; in Victoria by the Inspector-General of the Insane, and in Tasmania by the Governor.

Discharge.—The discharge of patients is usually carried out on the recommendation of the medical superintendent by an order from the Inspector-General or an official visitor, and this is the course generally adopted where the patient has recovered. Where, however, the patient has not recovered, and the friends seek the discharge, it may be granted by the Inspector-General or official visitor, on the recommendation of the medical superintendent, if the patient is not dangerous, and if a relative or other friend signs the request for the discharge, and undertakes that he will be properly taken care of. In Queensland the Minister is required to sign the discharge warrant in this case. Should the superintendent object to the patient's discharge it may still be carried out by

the Inspector-General or the official visitor, or in Queensland by the Minister, after the objections have been placed in writing, so that they may be carefully considered. In Victoria, however, the official visitor does not discharge, but recommends in a similar manner to the medical superintendent. Discharge is also granted on the expiration of leave of absence if the patient has recovered, and the medical superintendent recommends it, or if a certificate by a medical practitioner is furnished intimating that the patient no longer requires hospital treatment. A patient may also be discharged on the petition of the person who signed the request for admission, or made the last payment for maintenance, or in the event of these not being available, by the next of kin. He may not be discharged in this way, however, if the superintendent considers him dangerous or unfit, unless the Inspector-General or official visitor accepts the responsibility of over-riding his certificate. Discharge may also be granted by a Judge of the Supreme Court, where the patient has been brought before him, and where, after inquiry, he deems the evidence sufficient to warrant his deciding that the patient is sane.

Leave of Absence.—All States give authority to grant leave of absence to patients, either on trial or simply on leave. The leave is granted by the Medical Superintendent, on the application of a friend, and with the consent in writing of the Inspector-General. A patient may also be given leave of absence by the Superintendent without the application of a friend, and he will then be in charge of some one placed in that position by the Medical Superintendent, or else in his own care. In South Australia and Tasmania, leave is granted by two official visitors on the advice of the Medical Superintendent, and, in Queensland, one official visitor has the same power. In Victoria, the Inspector may grant the leave on his own authority without a recommendation. The leave is to be granted for a definite period, except in South Australia, where it may be for any period. The power to give leave of absence has been of inestimable value, and is largely availed of. Not only may convalescent patients be discharged earlier than would be justified without it, or doubtful cases tried outside, but unrecovered patients may be permitted to go to their homes for short periods, and those liable to renewed attacks may spend the intervals with their friends. Again, by permitting a patient to be absent or leave to himself, as it is called, many cases can be allowed to leave the hospital who have not sufficient confidence in their own stability to be discharged. They are aware that they still belong to the institution, and can return at any time they desire, and thus the nervousness they would otherwise feel is allayed. Others, again, who could not well be trusted with the control of their property may be allowed personal liberty under their own care. It may be of interest to state that the number of patients granted leave of absence in 1907 was, for New South Wales, 314; Victoria, 400; South Australia, 115; Queensland, 115; Western Australia, 52; and Tasmania, 32—a total of 1,024; the total number of patients in the hospitals in these States being 14,453. In Scotland, in 1907, 167 patients were granted leave of absence; the total number of patients in the hospitals being 17,908. It is evident that a much greater use is made of this method of discharge in Australia than elsewhere.

At the conclusion of the period for which the leave of absence has been fixed, the patient must return, unless it has been renewed, or he has obtained a medical certificate that he is fit to remain away from the hospital. In the event of neither of these conditions being complied with, a patient may be recaptured, as in the case of an escaped patient.

Mechanical Restraint.—In Victoria, there is a special provision in the Lunacy Act restricting the use of mechanical restraint. In none of the other States is this thought necessary, and it is probable that even here it would be beneficial to have it eliminated from the Act. There are a certain number of exceptional instances where a patient requires to be restrained, either to prevent injury to himself, or on account of extreme violence or restlessness, and in which the restraining influence of attendants or nurses will be productive of more irritation than mechanical means. The actual number of such cases is perhaps small, but it is, nevertheless, in the interests of the patient that some form of mechanical restraint should be adopted in place of that of the attendant. In all the States, an efficient inspection is provided, and inquiry into the cases in which restraint has been used is made by the Inspector-General at his visits. There is, therefore, but little fear of its undue use, whether it is prohibited by enactment or not.

Habitual Drunkards—Western Australia.—In Western Australia authority is given to admit habitual drunkards to Hospitals for the Insane, but to a special ward to be set apart for the purpose. This does not commend itself as a thing to be imitated elsewhere. All experience of inebriates and of alcoholic cases shows that they are a difficulty in Hospitals for the Insane, and that they cannot be allowed to mix with the insane patients without detriment to the latter. If a separate ward is to be provided, it is to be presumed that its recreation grounds and staff would be distinct from the hospital, and as this would involve an increase in the size of the establishment, there is no great reason why it should not at once be made an independent institution. If for the purpose of economy, the higher officials of the hospital are asked to supervise it, this can be done equally well by having it built on an adjacent site, as by combining it with the institution itself. The undesirability of mixing inebriates and insane is recognised in Western Australia, since it is enacted that where a licensed house admits inebriates, it must not also take insane patients. Inebriates are admitted on the order of a Judge, and after the hearing of two medical witnesses, and for periods up to twelve months, and they may be granted leave of absence for specified periods. They may be recaptured if they escape.

Oversea Patients.—With the view of preventing the importation of insane patients, or of degenerates who may become insane shortly after arrival, the Commonwealth has introduced a clause in its Immigration Act, by which it may prohibit the landing, or may deport, patients who are insane on arrival. In addition, in some of the States there is a special provision in the Lunacy Statutes for excluding such cases by making the shipping companies liable for the maintenance of the patient in the Hospitals for the Insane, or by permitting them to return him to the port of embarkation. In some, the patient must be insane on arrival, in others, the penalty is enforced if insanity comes on within 60 days of arrival. There is no doubt that these legislative enactments have proved of great value to Australia in diminishing the number of cases which have been sent off by their friends in other countries as undesirables, and have thus been conveniently got rid of, and it would not be wise to relax their stringency.

Removal to Other States.—In New South Wales, Victoria, Western Australia, and Queensland, the Supreme Court has power to order a patient's removal to any place beyond the State, if there are relatives or friends there who are in a position to take charge of the patient. The Court is

at the same time also given power to make directions as to the patient's maintenance, and that sufficient security for it being continued should be given. The patient transferred to the adjoining State is thus prevented from becoming a burden on the institutions there, even though the Court in the original State has no longer jurisdiction over him. Needless to say, this is used only in extreme cases.

Inter-State Agreements.—A special provision for Inter-State relations was brought into force in New South Wales for the benefit of patients from Broken Hill and district. Before this legislative enactment was made it was necessary to remove Broken Hill patients to Sydney, a journey of more than a week's duration, and of an extremely costly nature. The enactment referred to provides that by arrangement with a neighbouring State, in this instance South Australia, insane patients from New South Wales may be admitted to the institutions of the neighbouring State and maintained there at the cost of the New South Wales Government. Since it was introduced in 1894, 119 patients have been dealt with in this manner, and at the present there are 29 resident in Parkside, and maintained there at the expense of New South Wales. Western Australia and Queensland have made a similar provision in their Acts, but so far have not required to make use of it.

Boarding-out.—In New South Wales, Victoria, and Western Australia provision is made for boarding-out harmless patients. The boarding-out has to be carried out under the authority of the Inspector-General, and on the certificate of the medical superintendent that the patient is harmless, and special regulations for its control have to be framed. The conditions of life in Australia differ so much from those in countries which are more thickly settled that boarding-out has not yet become a prominent feature of its lunacy work. For successful boarding-out it is of assistance to have a number of suitable homes in places where families have remained for years. The residents in these cases become attached to the locality, and the environment is such that the insane patients are surrounded by the atmosphere which is most suitable for their welfare. In Australia the people move from place to place as the means of obtaining work vary, and the more settled conditions of life referred to above have not yet been attained. The experience of Scotland and some other countries in this respect is, however, so encouraging that, in spite of the local difficulties in Australia, it should be tried, and doubtless by introducing the system in a small and tentative manner, and by confining it to suitable localities, it would take root and prove of advantage in reducing the population of the institutions.

Boarding-out to Relatives.—There is a provision in New South Wales, Western Australia, and Queensland by which friends and relatives who are willing to take unrecovered patients, but cannot afford to do so, may be granted a monetary allowance, and this has proved of some value. The patient is discharged from the hospital, but if he proves unsuitable for living outside he may be re-admitted on the order of the Inspector-General without other papers. This is boarding-out in a most useful form, as it insures the patient a suitable home with his own relatives, and avoids the risk of his being taken merely as a revenue-producing individual. Unfortunately, however, it cannot reach such large numbers as boarding-out proper.

Licensed Houses.—In all the States except South Australia and Tasmania there is authority to establish licensed houses. The licence is granted by the Minister for a period not exceeding three years in all but Victoria,

in which it is not fixed. However, the practice is to grant a licence for one year only, and this course is to be recommended, as it introduces a more efficient control over the institutions. The licensee is aware that unless the house is properly managed, and that unless recommendations are attended to, the licence will not be renewed, and this is more useful than providing penalties for failure to comply with the requirements of the Act. A medical man must reside in the licensed house where the patients exceed a prescribed number—20 in Queensland, 25 in Western Australia, 50 in Victoria, and 100 in New South Wales. Where the number is less than this, visits by a medical practitioner must be paid daily, twice a week, or less frequently according to the number of patients. Where the medical man is resident he must be the superintendent, whether he is the licensee or not; and where there is no medical man resident, the licensee must be the superintendent and reside. In Victoria, however, the licensee must be the resident superintendent whether there is a resident medical officer or not, and he is prohibited from acting as medical attendant on his patients. The arrangement by which the resident medical officer is the superintendent is to be commended, and is following the practice which has been found of so much value in hospitals for the insane themselves. A resident medical officer who is not the superintendent cannot be sure of having all his recommendations carried out, and may be discouraged in initiating improvements and reforms if want of attention to them is shown by the superintendent, who is, probably, more readily influenced by motives of economy. His appointment gives the necessary authority and control, and can alone insure that the institution is under proper medical supervision. On the other hand, it is not easily seen what objection can be taken to the licensee, if he is a medical man, attending professionally to the patients in his institution or to his being the superintendent. No one is more interested than he in seeing that the patients are attended to in the best possible manner since the reputation of his house depends on this. In Victoria, the medical officers, and the general staff of the licensed house, must be approved by the Inspector-General. It is doubtful if this can prove of much practical value, it being obvious that he cannot very well personally interview and select applicants for these positions, and his approval must necessarily be of more or less formal character. Although it provides a means of refusing permission for the appointment of persons known to be unsuitable, it is probable that an equally valuable power to prevent this is obtained in the usual inspection. In other States the name of the resident medical officer alone has to be submitted on his appointment.

Licensed Houses for single patients.—Licences may be granted for a house with a single patient, and for this the stringent regulations just detailed are not insisted on. The medical visits are confined to that of a practitioner once a fortnight, who must not be related to the licensee, professionally or otherwise. In Victoria, the Act permits the licence to be issued in this manner, or with the full condition of the ordinary licensed house, as may be determined at the time the licence is issued.

Paying Wards.—In Victoria, there is provision in the Act for the establishment of paying wards in the hospitals for the insane, and the Master-in-Lunacy is given authority to collect charges for maintenance in these wards, and his approval is necessary before a patient can be admitted to them. The patient must also be removed from the paying wards if the Master-in-Lunacy directs this to be done, because of the cessation of payments. This was enacted in 1890, in an amending Act, which

abolished the licensed houses. In the later Act of 1903, the authority to establish licensed houses has again been granted, and the necessity for this special clause is, therefore, not now so pressing. There is nothing to prevent any State establishing such wards in its hospitals for the insane, and it is entirely a question of policy, depending on the local conditions, whether private patients are left to private enterprise, or provided for by the Government. A great deal may be said in favour of either plan, and it is probable that the public interests are best met by adopting the middle course of providing for well-to-do patients, in both State hospitals and in licensed institutions. A considerable section of the public would prefer to use the State institutions, because of the greater confidence felt in them, but, on the other hand, a number desire the extra comforts and privacy which can better be obtained in a private institution, specially established to cater for this class.

Criminal Insane.—All the States have special sections in their Acts dealing with the Criminal Insane, and in New South Wales and Victoria, criminal hospitals have been set apart, distinct from the other institutions for the detention and treatment of these patients. The numbers who would be admitted do not yet warrant the other States taking this step, and their criminal patients are therefore placed in the general wards. The admission of criminal patients is by warrant of the Minister, or the Governor, on receipt of medical certificates, with the exception of those cases where the patient has been found insane on arraignment before a jury specially selected to try this fact, when no medical certificate is required. On the patient's recovery he is discharged by the same authority, viz., the Minister or the Governor, on receipt of certificates signed by the Superintendent of the Hospital, the Inspector-General, or other specified medical practitioner. If the sentence is unexpired, the patient is returned to prison. If it has been determined, by effluxion of time, he is discharged altogether. Should the patient still be insane on the conclusion of his sentence, his name is removed from the books of the criminal hospital, and he is transferred to a free ward, unless he is certified to be homicidal or dangerous, when, on a special warrant from the Minister, he may be detained in the criminal division. If a prisoner becomes demented, and not dangerous, he may be transferred to a free ward, even though his sentence has not expired. Where a patient has been acquitted of his crime, on the ground of insanity, he becomes a Governor's Pleasure Prisoner, but in most States he does not consequently become a patient in a hospital for the insane. It is still necessary to obtain certificates of his insanity, and forward these to the Governor, who then authorizes his admission to the criminal hospital. These cases may be discharged conditionally, which amounts to granting leave of absence on trial, a concession which is not permitted to other criminal patients in any but South Australia. In most of the States it is enacted that a patient, committed for trial on account of attempted suicide, if insane, may be certified by two practitioners, and sent on to an ordinary hospital for the insane, and that, on his recovery, he may be discharged by the Inspector-General in the usual manner; he is then not liable to be tried for his offence.

Observation Wards.—In New South Wales, Western Australia, and Queensland, it is provided that observation wards shall be established in the gaols, and that prisoners serving sentence, who appear to be insane, must be placed in them by the prison authorities. These wards are visited by the Inspector-General of the Insane, and a prisoner once admitted, can

only be removed on a certificate signed by him and another medical practitioner, whether he is to be discharged recovered, or certified, and transferred to a hospital. This is the only instance in which the Inspector General is permitted to sign a certificate for admission.

Legal Proceedings.—All the States, among various other legal technicalities, provide for a penalty of £20, or six months' imprisonment, for neglect or ill-treatment of a patient on the part of any of the officers or staff. At the same time, however, they afford protection to the staff in that proceedings may not be taken in connexion with any act if it has been carried out in good faith and with reasonable care; and in New South Wales, Victoria, and Western Australia no suit lies unless it is begun within three months after the act or of the discharge of the patient from the hospital. In South Australia this bar also exists, but for twelve months.

Second Part.—It would be wearisome to enumerate the other more technical points in the Lunacy enactments, as they refer more particularly to the formal question of law, the powers of the Master-in-Lunacy, or the administration of property, and are not specially interesting medically; and I turn, therefore, to describe the general administration of the hospitals, their management and inspection, their staff, and the methods of dealing with the acute insane and with recent admissions.

Administration of Hospitals for the Insane.—Hospitals for the insane in Australia are State institutions, supported wholly from the public revenues, any moneys collected from patients or their friends for maintenance being paid into the public funds, and not reserved specially for the upkeep of the institutions. An officer appointed by the State, the Master-in-Lunacy, becomes the public trustee of patients admitted to the hospitals, and is clothed with the necessary legal powers to administer their affairs from the moment of their admission. He also fixes the rate of maintenance paid according to the means of the patient or his friends, and collects and pays it to the State. The institutions are thus relieved of the responsibility and the labour connected with these financial matters, and this is no small boon. At the same time, the administration of the estates of patients is probably more efficiently carried on by a department specially devoted to the purpose. In South Australia and Tasmania, however, arrangements for a Master-in-Lunacy have not, so far, been made, and the duty of managing the patients' property is imposed on the hospital authorities.

Title of Hospitals.—The State institutions are called "hospitals for the insane" in all but South Australia, where the word "asylum" still obtains, the intention being to avoid the suggestions associated with the older term. New Zealand has lately adopted the name "mental hospital" for its institutions, and this is, perhaps, even better and more euphonious than "hospital for the insane."

Licensed Houses.—In only two States are there licensed houses, or private institutions, apart from the State hospitals, viz., Victoria and New South Wales, and in these the number of patients is 172, amounting to 1.7 per cent. of the whole number of patients in these States.

Inspector-General.—The hospitals are maintained by the States, apart from the Commonwealth, and form in each a distinct service. The administration is by an Inspector, or Inspector-General, who is the official head of the Department, and who combines in his office the duties of Commissioners of Lunacy and of a departmental administrative head.

The full responsibility of the administration rests with him, and he appoints and dismisses the general staff, nurses, attendants, and outdoor staff. The higher offices, medical officers, clerks, &c., are not appointed by him, except in Victoria; but in most cases he is consulted, and his recommendation guides the appointment. The medical officers are appointed to the Department and are transferred from one institution to another as the service requires, receiving promotion according to merit or seniority.

The Inspector-General of the Insane is required to pay formal visits of inspection in New South Wales and Queensland at least once in six months, in Victoria and Western Australia once in three months; but, as a matter of fact, visits are made much more frequently for administrative purposes. In South Australia and Tasmania, where the number of hospitals is yet small, an Inspector-General has not been arranged for, his duties being carried out by the official visitors of the institutions with the medical superintendents; and in Western Australia and Queensland the Inspector also acts as superintendent of one of the hospitals. In Victoria the Inspector-General is appointed for a term of five years, and to increase his independence he is placed outside the Public Service Acts, and is removable only by Parliament. In other States the appointment is like that of most public officers, without a limit of time.

Official Visitors.—Official visitors are also appointed, who are directed to visit once a month in some States, and once in three months in others; in South Australia once a week. Of these visitors one requires to be a medical man, and one a member of the legal profession or a magistrate, two at least being appointed for each hospital. In South Australia the number is six, and no profession is definitely specified. In Victoria the qualification of the official visitors is that they must be justices of the peace, otherwise there is no profession specified. In this State, also, the same official visitors are to be appointed for all the metropolitan hospitals, others being selected for the country institutions. The appointment of official visitors is not for any fixed time, except in South Australia and Tasmania, where it is for one year, subject to re-appointment annually. The same official visitors may be appointed to more than one hospital, and they may be appointed to hospitals for the insane, hospitals for criminal insane, or to licensed houses. To insure their independence, they are not permitted to sign certificates for admission to hospitals or licensed houses, nor to attend professionally a patient in a licensed house, or have direct or indirect interest in it. In Victoria, however, it is provided that the official visitor may not visit the licensed house while he is attending a patient in it, which would appear to extend to him a right, denied in the other States, of attending one of his patients there, provided he suspends his official visits for the time being.

The official visitors are directed to inspect in much the same terms as the Inspector-General, but they have no administrative control, and they report on each visit to the Minister under whom the Lunacy Department is placed. The special value of official visitors consists in their being available as an outlet for patients' complaints, and to satisfy the friends that there is some one outside the officials of the Department who will see the patients, and be able to investigate complaints and report on possible abuses. While their inspections are guided by this principle, it may be felt that the appointment is of advantage, and for this purpose it is probably more valuable to select official visitors from those residing in the neighbourhood of the institution, and to confine each appointment to

a single hospital. In this way the visitors would acquire a distinct interest in the hospital itself, and would avoid the risk of creating what might easily become a class of professional official visitors.

Inspection of Licensed Houses.—As regards licensed houses, the Inspector-General has the same powers of inspection as for the State hospitals, and although he is not placed in charge of their administration, any recommendations or instructions he may give are, as a rule, readily carried out, his relation to the patients, as to admission, discharge, leave of absence, &c., are in all respects similar to those in the public institutions. Official visitors, too, where appointed to licensed houses, carry on their inspections on the same lines as in the State hospitals, and report in the same manner.

Inquiries.—Both Inspector-General and official visitors have power to summon witnesses and examine them on oath, if necessary, in connexion with any inquiries which they may have instituted in relation with their duties.

Inspection of Patients in Private Houses.—Where uncertified patients are treated in private or unlicensed houses, there is no provision for official inspection. In some of the States—New South Wales, Western Australia, and Queensland—it is provided that where a patient is kept more than a year, even if by a relative or by some one who derives no profit from the case, should there have been any restraint or coercion at any time during the year, the case must be reported to the Minister, who can direct an inspection to be made; and if it is found that coercion or restraint has been used, may then order his removal to a hospital for the insane. This is intended to provide against ill-treatment of patients in private houses; but it does not cover the cases of insane patients placed under treatment in nursing homes which have not taken out a licence. As yet, none of the States have made provision for permitting patients in the early stages of their disease to remain under private care on the certificate of a medical man, and none of the States have approved of insane patients being detained other than in hospitals for the insane or licensed houses, and most of the States have directly prohibited it. At the same time, there is no doubt it is carried on to a considerable extent, and, it must be recognised, not altogether without advantage to the community. It would, therefore, be advantageous to give statutory permission for the practice under suitable regulations. The stigma of insanity consists almost more in the certifying of the patient than in admission to a hospital for the insane; and if in a recoverable case this can be avoided, the State should be expected to facilitate it. At the same time a two-fold risk must be guarded against—firstly that nurses or others, who mainly desire to obtain an income from the patients, may detain them in unsuitable premises; and, secondly, that patients are not kept in nursing homes, where, through want of familiarity with the treatment best suited to cut short the attack, otherwise curable cases become chronic. Active ill-treatment or neglect need not be considered here, as with this class of patients it is not at all likely to occur. There is already ample power to deal with it under sections of the Act. It would appear useful to permit the treatment of uncertified mental patients in suitable private or unlicensed houses on a certificate from the medical attendant corresponding to that required in notifying infectious diseases. Under this arrangement when a patient with mental disease is being treated in a nursing home or private house, the case would be notified by the medical attendant to the Inspector-General of the Insane, a copy of the certificate

being left with the person in whose care the patient is to be. The Inspector-General would then have a right to inspect, although it may not be necessary that he should do so in every case. Whether he visited or not depends on the facts as disclosed in the certificate, and on other features of the case, such as its duration, its nature, his knowledge of the parties, &c. The length of time for which a patient is to be so treated should be defined, and, if desirable, the number of cases to be received in any one house, or taken charge of by any one individual, could also be limited. Such an arrangement, by its simplicity and the ease by which a patient could be brought under its action, should secure ample provision for the early treatment of acute mental cases. It should, at the same time, go a long way towards educating the public to place insanity on the same level as other diseases, as they would become familiar with cases of mental disease treated by ordinary practitioners outside hospitals for the insane, and alongside ordinary illnesses. When in course of time these patients recovered and again resumed their place in the community, the stigma which at present follows an attack of mental disease would be considerably lessened, since in most cases the nature of the illness would not be generally known, as would have been unavoidable had they required to be treated in an institution for the insane.

Medical Staff.—The medical staff of the hospitals, following the generally adopted custom, consists of a medical superintendent, with such assistant medical officers as the size of the institution warrants. The proportion varies considerably in the different States from one medical officer to 500 patients, upwards to one medical officer for 200 patients. In most, the economic point of view has been dominant in deciding on the medical staff, and there has been an evident desire to appoint no more than sufficient to cope with the work. This means that the officers have their time so fully occupied with routine work that but little is left for scientific research or for the advancement of our knowledge of insanity. It must be agreed that this is a mistaken policy, and that if the State would expend more money on the medical staff, and in encouraging the more scientific of the officers to engage in research, in course of time an ample reward would be gained. In New South Wales the proportion of medical staff to patients is about 1 to 300 in the ordinary receiving hospitals, and in the more chronic hospitals 1 to 400. In Callan Park, however, the proportion is 1 to 200, there being five medical men on the staff. This largely increased staff has been appointed to enable more advanced and careful work to be undertaken, and ample facilities in the shape of clinical rooms, laboratories, &c., have been provided. It is much to be desired that this be imitated in all other hospitals, which admit a sufficient number of acute cases to supply enough material for the work.

Medical Superintendent.—With the medical superintendent, the conditions of the hospital administration are such that it is difficult for him to detach himself from the general administration and take an active part in the scientific, or even in the clinical, work. This is much to be deplored, as it is easy for the medical staff to fall into routine habits unless they have before them the example of a superintendent who is equally enthusiastic in the details of medical work as they are. Nothing is more certain than that a junior staff will be moulded by the senior officers, and that the best results in raising the hospitals to a high level in the medical and scientific world can only be obtained where the medical head is able to give sufficient time to the direction and encouragement of his medical

staff. It is, of course, necessary for the medical superintendent to be in touch with the routine work of the institution on both its lay and medical sides; but if a suitable business assistant is provided it should be possible for him to relieve himself of all lay routine and make it necessary only that he should be the official arbiter in all questions which may be referred to him without requiring to carry out detailed lay work. To attain this, the lay assistant should be given a certain independence of position, and should be a somewhat superior officer to the general secretary or steward usually appointed, with a title somewhat defining the increased dignity of the office. No doubt the position is a difficult one to fill properly, as where both men are energetic there is risk of having two officers, one medical and the other lay, jealous of each other's privileges; but if the medical superintendent is tactful and sufficiently anxious to secure time to devote himself to the medical aspect of his work, no serious difficulty should arise. It is only by this means, or some similar arrangement, that the hospitals for the insane can be raised and kept up to a proper level in the line of medical progress and the medical staff relieved from the opprobrium of being denoted mere institutional managers. At the same time there should be no relaxing of the rule that the medical superintendent is the supreme head.

Pathologist.—In New South Wales and Victoria a special pathologist is provided. The Victorian appointment, however, is hardly made on the lines best calculated to obtain scientific results of value. The salary provided is too small to expect a man of high attainments to devote himself entirely to the work; and as it is directed that he is to perform *post-mortem* examinations in all deaths in the hospitals, his time must be too much occupied by this duty to permit him to engage in serious research. In New South Wales, the pathologist is given a more independent position, and the salary is sufficient to place him on a level with the medical staff of the hospitals. His time is wholly devoted to research work; and though he is not expected to perform *post-mortem* examinations, which are left to the regular medical staff of the institutions, he is at liberty to go to all the hospitals and obtain material. He has a central laboratory situated in the University, by the courtesy of the University authorities, and in this his main work is carried on; but he is specially attached to Callan Park, where he has a definite standing in the laboratory and in the wards, and has the assistance of the medical staff there and of the clinical clerks and such of the medical officers in the hospitals as are engaged in research. The laboratory is open to any of the medical staff who desire the opportunity of scientific work, and the privilege of doing so has been availed of to a considerable extent.

Nursing Staff.—The nursing staff in most of the States is now trained, the nurses and attendants having to attend courses of lectures and pass examinations during their first two or three years of service. The training was instituted as far back as 1887 in New South Wales, and in 1894 in Victoria, South Australia following in 1901, and its effect in the improvement in the nursing in the hospitals is beyond question. Each State has its own syllabus, and its own arrangement of the details of training; but the essential features are similar in all. The course extends over two years; but in New South Wales it has recently been increased to three years, so that it may accord with that followed in general hospitals. On successfully passing the final examination a certificate of efficiency is awarded.

No pensions are given to the retiring staff, although undoubtedly this would go far towards obtaining a better class of applicant and diminishing the number of changes in the staff which at present annually occur.

The hours of duty and leave of absence given to the staff in the various States vary according to local influences, and are generally considerably more liberal than those of nurses in general hospitals. In some cases a proportion of the attendants in the male wards go to work with the patients in the grounds; but in others the indoor staff is completely separate from the outdoor, so that an attendant's duty is entirely confined to indoor nursing. This system is undoubtedly that most likely to improve the nursing of the insane. It cannot be expected that attendants whose duties consist partly in nursing and partly in outdoor work can acquire such nicety of manner as will justify their challenging a comparison with nurses.

Incipient Cases and Reception Houses.—In this review of the conditions in hospitals for the insane in Australia, the more recent attempts to deal with incipient cases have been but lightly touched on. This, however, ranks among the most urgent and important questions now before the minds of alienists, and is being seriously taken up by at least two of the States. In New South Wales, Dr. Manning many years ago introduced the principle of the reception house for observation and treatment of those early cases, and most of the States have included a provision in their Lunacy Acts for similar institutions. These reception houses, though they have done admirable work in this direction, cannot properly cope with the incipient insane, and are not in a position to settle the whole question. Their functions are to act as a filter to prevent the admission to the hospitals of alcoholic patients, and of those with delirium tremens, and to offer an opportunity of deciding as to the insanity of transient and doubtful cases, and to assist in the classification of patients in transit to the hospitals. They should not properly take the part of an acute hospital, in which cases are treated to recovery, except those of transitory insanity or of slight insanity, which do not require certification or long detention. The reception houses must necessarily pass through their wards a great variety of forms of insanity, both curable and incurable, and it is, therefore, impossible to insure such a classification in them as would give the acute cases the separation from other patients which is necessary for their proper treatment. The number of alcoholics to be dealt with alone forms a formidable contingent, and if the reception house is used as an acute hospital, it should have separate wards for the alcoholic, as distinct from the insane patients. It is in every way better, therefore, to limit the reception house to its proper place as an institution for observation and for the distribution of patients to the hospitals for which they are most suited, and to deal with the acute insane in another manner. Several alternative proposals are open for selection as to the best method of carrying this out.

(1) In most countries the hospitals for the insane themselves are making provision for acute cases by adding new admission wards as acute hospitals, separated as far as possible from the general hospital, so that they may form a quite distinct institution. By this means a mental hospital is created within the grounds of the institution itself.

(2) In some instances, *e.g.*, at Glasgow, in Scotland, Albany, in New York, and in some of the German towns, these early cases are treated as uncertified patients in buildings attached to the general hospitals, or to the poor houses, and not to the hospitals for the insane.

(3) A mental hospital such as was advocated by the Commission presided over by Dr. Brudenell Carter, and which the magnificent bequest of Dr. Maudesley has now enabled the County Council to erect in London.

In Australia, New South Wales and Victoria have each progressed along one or other of these paths. In Victoria a reception house is being established which undertakes, in addition to the function of a reception house proper, some part of the early treatment of insanity, and a mental hospital has been opened to which the curable cases from the metropolis are to be sent. As the patients admitted to a mental hospital, however, must be certified, it is to all intents and purposes a hospital for the insane, limited in its admissions to acute and curable cases. It differs from the regular institutions, therefore, by dealing with curable cases, by its situation, its separation from the chronic insane, and by the constitution of the staff. The necessity for certification, it is feared, will hamper its action in diminishing the stigma of insanity or in persuading the patients to place themselves early under treatment. In New South Wales, on the other hand, a different route has been followed. A mental hospital has been, or is being, added to each of the hospitals for the insane, in place of being erected in a central situation. Though within the grounds of the hospital, it will exist distinct from the general building, and under a separate nursing staff, and in it patients may be treated from admission to discharge without entering the general wards. The patients sent to these will have all the advantages of a separate mental hospital; but will not be able to avoid the disadvantage of having been certified, and of being known as having been in a hospital for the insane. These mental wards, therefore, will not be able to prevent the stigma of insanity, although they should be of great value in providing facilities for early treatment, and thus increase the recovery rate. The staff consists of the regular resident staff of the hospital, and has not associated with it visiting honorary medical officers. In addition to this, however, provision has been made for uncertified patients. It was hoped that the larger general hospitals, following the example of other countries, would open a mental ward, so that suitable cases could be treated without requiring to be certified and sent to a hospital for the insane. So far, difficulties have prevented this being realized; but it is still hoped that in the future it will be carried out. In the meantime a small ward has been erected on ground adjacent to the Reception House in Sydney, in which uncertified male patients are being treated. The medical staff consists of honorary visiting physicians, and the nursing staff of nurses in the day time, and an attendant at night; and the conditions are as similar to those of a general hospital as possible.

All classes of the acute insane are thus provided for, the early, the slighter, and the borderland cases in the ward for uncertified patients, and those whose disease requires the restraint and surroundings of a hospital for the insane in the mental hospital attached to the institution. In these cases the patients treated are of the curable class, those suffering from incurable forms being sent to the general wards of the hospitals, to which also are transferred the cases which have not recovered in the acute hospital. By appointing an honorary medical staff selected from the ranks of practitioners in the city, it is hoped that certain advantages will accrue not only to the institution, but to the profession at large. The experiments in these States, if experiments they are, are, at any rate, a sign of continued interest in seeking a solution of the problem of dealing with the constantly increasing numbers of insane patients in the community,

and will doubtless also help to a definite result in the near future. It should also be noted that in Western Australia a mental ward is already in existence in connexion with the Perth Hospital, and that it is proposed to extend this system to other hospitals in the country. This ward is supported jointly by the hospital and the Lunacy Department, the staff being provided from nurses trained in the hospitals for the insane, and the maintenance of those proved to be insane is defrayed by the State. The patients are visited by the resident staff, and also by the honorary staff of the hospital.

RECENT HOSPITAL PROVISION FOR THE ACUTE INSANE IN NEW SOUTH WALES.

ERIC SINCLAIR, M.D.,

Inspector-General for the Insane, New South Wales.

The methods of treatment of the acutely insane being in process of reconstruction everywhere at the present time, I have thought it of interest to describe what is being done in New South Wales as regards the remodelling of the institutions and the erection of new buildings. The principle which has been followed is to provide for the different classes separately, the acute and recoverable insane, the ordinary patient, the demented and feeble, the chronic industrious, &c., &c.

The acute insane are themselves dealt with in two ways, first, the cases which have not yet been certified, and in which it is desirable, or possible, to carry out treatment without this legal disability; and, second, those which are not suitable for treatment in this milder way, and which require the restraints of a hospital for the insane. For the first, a ward has been opened in Sydney for male patients, with an honorary visiting medical staff. The ward is small, because of the limited site, but it has complete arrangements for treatment and examination. For the second, a separate mental hospital is being erected in each of the hospitals for the insane which admits patients direct. These mental hospitals are detached from the general buildings, and placed at some little distance from them, and are complete institutions in themselves. They consist of two or three wards for each sex, for classification, and have attached to them facilities for clinical examination and treatment. The number for which they are designed is proportionate to the number of admissions to the hospital, and is, in every case, small, so as to avoid the risk of their being used for unrecoverable or chronic cases. It is recognised that their nursing staff will be considerably larger, in proportion to the patients, than in the general wards, and that they will consequently be expensive, but it is believed that the financial results will be satisfactory in the long run owing to a proportionate increase in the recovery rate. One advantage of having these small mental hospitals attached to the hospitals for the insane, in place of providing one large central hospital in the city, must not be overlooked, *i.e.*, that by leaving with the officers of the hospitals the oversight of the acute patients their medical interest is kept at a high pitch, and they are prevented from lapsing into mere routine officials, as might be feared if they ceased to see curable cases and received only those which had passed through the mental hospital, and were not considered suitable for it. Another is, that attaching the wards to the hospitals brings them

within convenient reach of patients in various parts of the country, who are thus able to benefit by the improvements in the treatment of insanity, which otherwise would be confined to the metropolis.

For the general class of accumulated insane, what may be called the ordinary hospital for the insane is being maintained, with its wards for recent admissions for feeble, sick, excited, convalescent, industrious, &c. &c. These are required for cases which may be described as the ordinary insane, and which, for their own safety or that of the community, require the safeguards of a well-designed institution.

For two other classes, still, there is separate treatment, first for the feeble, senile, demented, and chronic cases, which hardly need more than infirmary supervision; and, second, the able-bodied, industrious, but chronic, patient, who may be usefully employed in out-of-door work. For the first, institutions of a simple design, situated within convenient reach of the larger centres, and with a minimum staff, are in use. For the second, an institution is being erected on a suitable site in the country, and with an extensive area of land, to provide occupation for the patients.

In New South Wales, institutions may be classified in accordance with these principles as follow:—

Special institutions for acute and curable patients only—

1. Ward at Darlinghurst, Sydney, for uncertified patients.

2. Mental hospitals for certified patients—

At Callan Park.—Small hospital of four cottages, two for each sex, with administrative building, accommodating 80 patients.

At Gladesville.—A similar mental hospital, accommodating 120 patients.

At Kenmore.—A mental hospital, consisting of two buildings, one for each sex, each of three wards, with administrative building. The wards will accommodate 38 patients.

At Parramatta.—Similar buildings to those at Kenmore, to accommodate 50 patients.

3. For the regular insane—

Callan Park.

Gladesville.

Parramatta.

Kenmore.

4. For the feeble, senile, and quieter chronic patients—

Rydalmere.

Parramatta (a large proportion of the wards).

5. For the industrial chronic insane—

New institution at Morisset.

6. For imbeciles—

Newcastle.

7. For epileptics—

Kenmore.—Special wards for male and female, accommodating 182 patients.

Rydalmere.—Special wards for male and female, accommodating 68 patients.

SYPHILIS AND NERVOUS DISEASES.

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Wales.

INTRODUCTION TO DISCUSSION.

Syphilis has been deemed by the President of the Congress a subject fit for discussion by all the sections. It is no new disease. Some writers have traced it back to some 4,000 years B.C., Chinamen being the unhappy victims, and recently the Egyptian Archæologists discovered specimens which, to the pathologist, are suggestive of syphilis, but Dr. Elliot Smith has decreed otherwise. The invasion of Europe seems almost like a fairy tale, for at the present moment there would seem to be conclusive proof that Europe was invaded from America, and that, by means of the crew of the ship in which Columbus had made his discovery in 1493. If so old, why is it still with us? Is it because we do not appreciate the disease in all its bearings, and that therefore the dicta of public health have not been applied to it? Is there a mawkishness about the earlier stages of the disease, which, in this hypocritical age, prevents our calling a spade a spade, and thus allows the disease to travel untrammelled? Syphilis is an insidious disease, producing a pathological picture complete, though not rapid; not one fell act, but a drama of many scenes, which, to the casual observer, are separate plays with no thread to connect them. I feel that many of us are unaware of the extent of the trouble produced by syphilis, for it is only of recent years that it has dawned on us that syphilis is a factor no longer to be treated with closed eyes.

In other sections, the subject of syphilis can be discussed with all the details of the picture before one's eye, cause and effect being self-evident, but when we come to results associated with a disease which was contracted years before, or even before the individual saw the light of day, we are surrounded by difficulties which, in the primary and secondary stages of the disease, are absent. The physician has difficulty in obtaining from the patient evidence that he has had syphilis, for the primary sore may have been very slight, no particular notice being taken of it; or the lapse of years have helped to obliterate the memory of its occurrence. The general practitioner is, as a rule, a man whose hands are full, and who finds that his time is so limited that it is impossible to go into all the details of the patient's family history and previous illnesses. Yet he may have attended the family for years, the wives in their illnesses, and the children in their early days, and may have seen collective signs suggestive of syphilis, which, to the casual observer, seeing only one member of the family, are not in evidence. Many a general practitioner goes through such a phase as this, yet the fact that feelings on this point are tender, prevent advice being given.

Syphilis has long been known to be a contagious disease, but the cause of the disease is still in need of absolute confirmation. Recently, strong evidence has been produced to show that the cause is a spirochæte, but the life history of the organism has still many gaps to be filled in before the cycle is complete. It is this uncertainty as to the actual *modus operandi* of the cause of the disease which has made the relation of syphilis to nervous and other diseases so open to dispute. There are at

present few scientific data to help us in our diagnosis. If we are dealing with a group of symptoms which are suspicious, and have a very indefinite history as to previous infection, we fall back on a course of iodides and mercury, and if the symptoms disappear we feel that our suspicions have been justified. After a certain period in the disease, iodides and mercury are believed to be useless, and, therefore, do not help as above in ascertaining that the patient is suffering from a disease associated with syphilis. However, the general feeling among neurologists is that if two symptoms occur together the diagnosis is confirmed, the two symptoms being the Argyll-Robertson pupil, and lymphocytosis in the cerebro-spinal fluid obtained by lumbar puncture.

We may say that syphilis affects the nervous system in two ways, first by producing an inflammation of the membranes of the brain and spinal cord, and of the blood vessels, followed by occlusion, with softening of these areas of the nervous system thus affected; and by gummata, and a tendency to sclerosis; or, secondly, by a lowering of the vital energy of the cells, giving rise to para-syphilitic affections, which Fournier states are a series of morbid manifestations which, although they have nothing syphilitic in nature, are none the less syphilitic in origin in that they are born of syphilis, and in all probability would not be produced without. Under the first heading, we have a group of diseases which we may call, collectively, cerebral syphilis. Two-thirds of these cases will be found to have been infected not later than six years before the occurrence of the nervous symptoms. The second series are called para-syphilitic, and include such diseases as tabes and general paralysis; four-fifths of these cases will be found to have been infected between six and fifteen years before the onset of the nervous symptoms.

Cerebral syphilis is made up of a great multiplicity of symptoms, some of these being grouped together as separate diseases, which vary with the seat of the lesion. If at the base of the brain, we have an implication of the cranial nerves, more especially of the third, fourth, and sixth, while if at the convexity of the brain, we have cortical paralysis, epilepsy, and mental disorders. Fournier has described six clinical types, but the main outstanding features of cerebral syphilis are:—Headache, with nocturnal exacerbations, epileptic attacks occurring in adult to middle life, paralysis of ocular muscles, optic neuritis, early hemiplegia, without loss of consciousness, and often incomplete, and a multiplicity of symptoms pointing to many different seats of disease. Cases such as these occasionally come under the care of the mental physician, and though, under the usual iodide and mercury treatment, the symptoms may for a time be relieved or disappear, prognosis is seldom a satisfactory one, when once symptoms of sclerosis, softening, or mental disorder have appeared. Fournier's figures are interesting. He states that of 100 cases of cerebral syphilis, 22 are favorable, 78 unfavorable (19 dying, 59 surviving for a time, but with permanent infirmities, *e.g.*, paralysis and mental decay).

Diseases of the nervous system occurring after the tertiary symptoms have disappeared are called para-syphilitic, or, by some, quaternary. The two outstanding diseases under this heading are tabes and general paralysis, and over the relationship of these to syphilis much discussion has taken place. Some authors such as Erb, Fournier, Gowers, Mott, Ferrier, and others state that they have definite proof that 90 per cent. of these diseases are caused by syphilis. Other writers are not so favorable. Fournier states that of 4,400 syphilitic patients, 631 developed tabes, *i.e.*, 14 per cent. Erb. in 1,100 cases of tabes in men of the upper classes obtained the history of

syphilis in 89.45 per cent. No history could be obtained in 10.54 per cent., but in many of these there was a possibility of syphilitic infection, and only in 2.8 per cent. could the history be regarded as entirely negative, that is as furnishing no evidence of a suspicion of the possibility of previous syphilitic infection. Control statistics were obtained from 10,000 men, also of the upper classes, over the age of 25. Of these, only 21.5 per cent. had suffered from syphilis, whilst in 78.5 per cent., there was no syphilitic history. Hence, in tabetic patients, a history of syphilis is obtained four and a half times more frequently than in non-tabetic men of the same class of society. Gowers has stated that amongst 100 consecutive cases of tabes in private practice, he had obtained unquestionable evidence of past syphilis in 68 cases, and in 12 there was a history of a chancre of uncertain nature and syphilis probable, so that in 80 of Gowers' cases, syphilis was certain or probable. In the remaining 20, syphilis was possible, that is, there had been exposure to the risk of infection, and in most cases several attacks of gonorrhœa. Gowers summarizes by stating that in none of the 100 cases of tabes could syphilis be excluded by the absence of any exposure to its risks, and that he has never seen a case of true tabes in a man who has never run risks in the ordinary way.

Of general paralysis, one has been unable to ascertain figures such as those for tabes, for the onset and progress of the disease is much more rapid than in tabes, and the mental state is such that family and previous histories cannot be obtained. Still it is a well-recognised fact that syphilitics are more often attacked than non-syphilitics, and that syphilis has a similar relation to general paralysis as to tabes. The extent of general paralysis is not appreciated, but the following facts should be interesting. Between the years 1878 and 1907, 1,167 deaths took place on the male side of the hospital for the insane, Callan Park, and of these 463 were certified to have died from general paralysis, a percentage of 39 on the total number of deaths; while on the female side during the same period there were 586 deaths, and of these 51 were certified to have died from general paralysis, a percentage of 8.7. These figures show that we are dealing with a dreadful scourge, and though the Callan Park figures seem big, those in the English Lunacy Commissioners' report for 1906 showed that some 20 per cent. of the deaths in all hospitals for the insane was caused by general paralysis. This would tend to show that the Callan Park figures cannot be larger than some of the English hospitals, for to get a percentage of 20 some hospitals must have had a very large percentage so as to make up for those hospitals in counties where general paralysis is very rare.

The theories as to the relation between syphilis and tabes, and general paralysis, may be summarized under three headings:—

- 1st. That the diseases are caused by the syphilitic poison.
- 2nd. That a toxin is produced in the system as a result of syphilis, and that this post-syphilitic toxin is the cause of the diseases.
- 3rd. That syphilis is simply a predisposing cause, and that it produces an impairment of the nervous system, and so renders it liable to degenerate from causes which would produce no effect in the healthy nervous system.

So far we have dealt only with nervous diseases arising from acquired syphilis, but those associated with congenital syphilis must also be considered. The same difficulties as to statistics occur here as in papasymphilitic affections, for it is well known how completely the symptoms of

infantile syphilis disappear in most cases, and how difficult it would be to prove the existence of syphilis in many of those children if they were seen first when they were six or seven years old. One's opinion must, therefore, often have to be based on the family history of the child. Dr. Still's statistics show 10 per cent. of cerebral affections in association with congenital syphilis, and most frequent of these are mental affections, either congenital or acquired. Less frequent are meningitis, gummatous affections, hydrocephalus, spastic paralysis, and epilepsy. Dr. Still suggests that idiocy is a commoner result of this disease than is generally recognised, and this is supported by Dr. Russell, of the hospital for the congenitally mentally afflicted, at Newcastle, New South Wales, who has informed me that of 448 cases of congenital mental deficiency, he has recognised 48 cases of specific origin, *i.e.*, 10.7 per cent. One disease is to the mental physician a striking example of the effects of congenital syphilis, *viz.*, juvenile general paralysis. In all cases of this disease, a carefully ascertained clinical history shows without doubt that the parents have been affected by syphilis; that many of the earlier children have been still-born; that others have lived for a few months or years.

A case of juvenile general paralysis in his earlier days seems at first delicate, but later a happy, intelligent, and robust child, till about fifteen or sixteen, when he begins to get mentally slow and apathetic, to pass into a state of idiocy, and is admitted into a hospital for the insane to be classified as a case of congenital mental defect, or of idiocy, the physician not being aware of the brightness and intelligence up to a certain point, and only recognising the symptoms of general paralysis from that steady down grade, with all the stages of the adult condition. The *post-mortem* examination reveals all the appearances found in ordinary cases of general paralysis. The well-defined relation of syphilis to juvenile general paralysis, and the similarity of the clinical and pathological pictures in both juvenile and adult general paralytics, have done much to strengthen the dictum, "without syphilis, general paralysis cannot occur."

When speaking of cerebral syphilis, one stated that the neurologist treated those cases with a feeling of confidence that the patient, if not mentally afflicted, would improve, if not recover. However, when a case of nervous disease comes to be classified as a case of general paralysis, the prognosis is very bad. Anti-syphilitic treatment has been tried in innumerable cases by innumerable physicians, and though occasionally recoveries, that is, a condition in which the patient is able to return to his former occupation, have occurred, they are only temporary. One has found that iodides alone produce no result, but that combined with inunctions of mercury, temporary recoveries have occurred. Amongst others, X.Y.Z. was a good example. He was a married man, age 42, and was admitted suffering from all the symptoms of general paralysis. He was an active-brained man, and had made a position for himself in public life. Inunction was used, and in a few months, all the symptoms had disappeared, and he had seemingly returned to his normal state. He left the hospital, and after a long holiday, he returned to his former work. The inunctions were not continued, for he felt well, and saw no necessity for same, and in a few months all the symptoms returned, and the subsequent history of the disease was a very rapidly fatal one. Examples such as these have also occurred after the administration of mercury intramuscularly. The cases were all well marked general paralytics, and the feeling one has is that if mercury can produce a temporary cessation of the disease in advanced cases, may it not produce a complete cessation of the

progress of the disease in very early cases, and that therefore the treatment of the primary disease should be a very prolonged one, *i.e.*, up to the period when tabes and general paralysis are likely to occur. Fournier treats for two years, then he gives a rest for a period of two years, then a year's similar treatment during the fifth, a rest during the sixth, and a course of treatment during the seventh. Some physicians, however, carry the initial course to the end of the third year, with intervals of two to six weeks, as the case may be, during this time. Recently a preparation of arsenic, soamin, has been introduced for the treatment of syphilis, the rationale of the treatment being that syphilis, if caused by a spirochæte, should be amenable to treatment by arsenical preparations, which have done well in diseases caused by similar organisms.

That syphilis is the cause of tabes, the most common of all the diseases of the spinal cord, and of general paralysis of the insane, which produces between 20 and 30 per cent. of the deaths in hospitals for the insane, is sufficient reason for us to consult as to what steps should be taken for the prevention of the disease. Syphilis constitutes a social danger not only from the damage which it inflicts on the individual infected, but from the dangers to which the infected person's family are exposed. Fournier states that of 887 cases of syphilis in women, 24 per cent. were married women leading a moral life. The ruin of the family from the incapacity of its head as a wage-earner, and, at the same time, the contamination of the wife and the rupture of family ties, lead to never ending troubles. Syphilis produces fatal results during the first months of pregnancy by causing abortions, during the later months of pregnancy by premature births, and soon after birth, an early death from general marasmus, the child living only a few weeks.

The above shows the serious danger not only to the infected individual, but also to society generally, and to the nation, from the general lowering of the average physique. We are living in a land of liberty when a man may, if he cares, subject himself to the dangers of syphilis. If the dangers ended with the infected person, the field of liberty might hold sway, but when the infected person is a danger to every one, it seems necessary that the liberty of that subject should be controlled, and that the law of the country should intervene. What the nature of this should be is a subject for this Congress to throw some light on. We are not lawyers, but medical men, and, therefore, from our point of view, the intervention should be of a medical nature, working at the same time in conjunction with the law-maker, and with the teacher of the people as far as the moral and religious aspects of the case are concerned. Police regulations may assist in the suppression of prostitution and solicitation, but human nature is human nature, and this alone is not sufficient to prevent the evil. The danger of the disease must be pointed out generally and openly, with no grandmotherly feeling of false modesty, and the disease should be notified as a contagious disease. Hospitals should be established where a prolonged treatment may be gratuitously carried out, and to begin with, the number of hospitals should not be stinted, so that individual care may be given, and the disadvantages of crowding avoided. Not only should treatment in these be a purely medical one, but the patient should be instructed as to the dangers he runs as far as his own future is concerned, and also as to the danger he is to those who are connected with him. Alcohol and tubercle are publicly attacked, and one hopes that syphilis will no longer stand unopposed, and that this Congress will produce sufficient evidence to show that for years we have slumbered, and allowed an enemy to creep surreptitiously in our midst, and that we must at once make amends for our sloth.

DISCUSSION ON DR. DAVIDSON'S PAPER.

DR. A. W. CAMPBELL (Sydney) said that at a meeting of the British Medical Association held in Portsmouth some years ago, at a time when the relation between syphilis and general paralysis was only beginning to attract attention, the honour fell to him of opening a discussion on this relationship; therefore the subject of syphilis as a factor in the production of nervous and mental disorders was one that had long held his interest.

DR. CAMPBELL gave it as his impression that immunity to syphilis could be demonstrated. Thus, if an individual able to show a clean ancestral history regarding syphilis had the misfortune to be infected, he would suffer severely and possibly succumb to the disease during the secondary stage. If, on the other hand, an individual with ancestral taint acquired the disease, he would suffer but slightly from the ordinary manifestations, and even escape parasyphilitic affections, of which general paralysis of the insane and eabes dorsalis were examples. Now, if for the word individual we substitute the word community, we get an explanation why, in countries like Bosnia and Abyssinia, said to be steeped in syphilis, both that syphilis is mild in form and parasyphilitic affections—general paralysis in particular—are uncommon. Prompted by the knowledge of what obtains in these countries, one may question whether the suppression of syphilis is wholly advantageous, one may argue that if syphilis were allowed to diffuse widely we would come, in course of time, to regard it as a disease no more serious than measles; but those of us who bear witness daily to the suffering caused by syphilis among our own people can only reply that the Abyssinians and the Bosnians have paid too high a price for their immunity.

DR. MACKEDDIE (Melbourne) said he was not a little surprised to find how small a percentage of insane subjects showed anything like striking syphilitic changes in the viscera. He expected to find a marked contrast, in that respect, to the conditions prevailing in his *post mortems* of the presumably sane. Of course, the brunt of the infection may have been taken by the brain membranes, and the viscera may have, comparatively speaking, escaped; and so the condition has been masked. This he had observed time and again in advanced general paralytics.

Drs. Hollow, Flashman, and O. Latham also spoke.

TREATMENT OF THE INSANE IN PRIVATE PRACTICE
IN VICTORIA.

W. BEATTIE SMITH, F.R.C.S., L.R.C.P., Melbourne.

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When the Australasian Medical Congress met in Melbourne in 1889, I dealt with "The housing of the insane in Victoria, with special relation to the board-out system of treatment." Since then I have had ample opportunity of satisfying myself that such a method of caring for, and treating, the harmless insane is not suited to our colonial life. Much

personal attention was given to this matter, and I was not satisfied with the results—the majority of the patients being in the care of officials of the various hospitals practically as servants. This was given a trial, as the official staff were practically the only applicants, not that I believed in the advisability of granting them patients. I ceased doing so because it was evident the cases were taken for what could be got out of them, a circumstance which existed also with other applicants. This method of caring for our accumulated insane population being demonstrated unsuitable, we, perforce, fell back upon institutional accommodation for the chronic harmless cases.

The Government still treats the insane as wards of the State, almost regardless of social distinction, and provides no more for those paid for at a higher rate of maintenance than was available twenty years ago. When I read my paper at that time no licensed houses existed, and, such being the case, I was fully of opinion that public institutions alone should be recognised, and that they should have proper reception wards, in the shape of an acute hospital, with all necessary appliances for observation and treatment, where new patients may be apart from chronic, or, at all events, advanced cases. These public hospitals should each be so arranged as to admit of providing for the treatment of patients of different classes, whether socially or mentally, and that segregation be the point to be arrived at.

As in my former paper, so now I would divide the State into districts, and arrange that each should have its reception wards, with laboratory attachments, for observation and treatment, its convalescent wards or pavilions, its wards for chronic cases requiring skilled supervision, and some accommodation for the chronic harmless insane, the epileptic being, for the most part, treated in a hospital specially set apart. No scheme would be complete without a pathologist, whose whole time would be devoted in a central laboratory, with facilities for visiting the hospitals and engaging in the live pathology of clinical work, and to training the A.M.O's. in scientific work in their separate laboratories. Such pathologist must, of course, be paid as a higher official.

Until quite recently this State neither properly cared for those who could be paid for at a higher rate of maintenance, nor would it license any one else to do so, and this brings me to the treatment of the mentally afflicted in private practice—houses for the care of those under certificate now being licensed.

First and foremost, then, we must recognise that many mental cases are certifiable which should not be certified, and still more are not certifiable, and yet need definite treatment. When we recognise that incipient insanity is that condition occurring between the first manifestation of mental disorder and the development of certifiable insanity, and that it also includes cases where the insanity, though obvious, is of recent origin, but not yet permanently established or confirmed, we find we have a big field to work upon. Such cases require removal (for the most part) from their usual surroundings; they require experienced nursing, rest, proper food, curative companionship, and skilled medical attendance. For such cases arising in the less well-to-do, and in emergencies, we have now a receiving house, which, under the jurisdiction of the Inspector-General of the Insane, and in charge of a physician skilled in diagnosis and acquainted with the clinical significance of the conditions presented, we have some provision made for those presenting perverted function or

disease of the brain, which either impairs or destroys mental integrity. Such cases are admitted on fairly elastic certificates, and private request, or by magisterial order on remand from Court, with one medical certificate; and there they remain until hallucinations, illusions, or delusions governing conduct towards self, others, or property, is sufficiently demonstrated to warrant the further certificate that disordered mental function and diseased want of self-control demand that they should be passed on to the general mental hospital. We, however, are no further on in the treatment of those who are able to be paid for at the higher rates of maintenance, and with greater privacy, because the treatment of gaol-remands, in association with others, is not desirable. Until the advent of licensed houses, five years ago, we had in our midst a few homes where such cases were cared for, and, for the most part, well cared for, in the same way as now under license—albeit against the law. Let us now consider what that law was, and the chronological order of events from the year 1867 and Act. No. 309.

NOTES ON LICENSED HOUSES AND BORDER-LINE CASES.

At common law there is no prohibition against harboring or taking the care of a lunatic for reward or otherwise, and prior to 1867 there was no statutory prohibition in this State. In that year the Act No. 309 provided (section 24) that licences to receive a "certain" number of lunatics might be granted, providing that where the house covered by the licence contained over 100 patients a resident medical practitioner was required, where there were over 50, and not more than 100, a daily visit was necessary, and where it contained 50 patients, or less, a visit three times a week was prescribed.

A licence might also be granted under section 44 for the reception of a single patient only.

Consequent on these provisions it was (by section 34) rendered unlawful to receive two or more "lunatics" into a house unless it was licensed, and also (under section 44) the receiving a patient as "a lunatic or an alleged lunatic" was, unless authorized under the Act, also prohibited.

In 1888, by the amending Act (section 34) licences for houses were discontinued, except for the reception of "single" patients, the prohibitions remaining as before. Under the Consolidation Act No. 1113 it was rendered an offence to receive two or more lunatics into any house (section 61) under any circumstances, but a single patient might be taken if the house were licensed, or if the person were otherwise authorized under the Act.

Under the amending Act of 1903, No. 1873, it has become lawful for any one to receive one or more patients if he obtains authority to do so or does so without deriving any profit from the charge. That authority may consist of—

(a) In the case of single patients—

1. The order of justices under section 24 (4).
2. The being the committee of the person of a lunatic so found.
3. The appointment by the Supreme Court.
4. The boarding out of the patient (sections 97 and 98).
5. The patient being on trial leave from an asylum (section 93).
6. The licence (section 56) with certification.

(b) In the case of more than one patient to an unlimited number. on a licence (section 56) and certificates.

The new feature is that no patient can be received into a licensed house without certification. The offence as now constituted consists of taking charge without authority of a person "deemed to be insane."

These words "deemed to be insane" in themselves amount to an admission that the person is not actually and demonstrably insane, but that for the purposes of the Act he is, under certain conditions, held to be insane.

He may be held to be insane either from his own acts and mental condition, where there is no restraint or treatment of him *ejusdem generis* with that applied in asylums, or he may be deemed to be insane when such restraint or treatment is applied to him without its being apparent that he is insane; so that, without entering into an investigation as to the fact of or the extent of his insanity, if the circumstances of detention, seclusion, treatment, or conditions usually considered proper or necessary with regard to persons under treatment for insanity, exist, the person will be "deemed to be insane."

In whose opinion is the person "deemed" to be insane? In the opinion of the person having charge of the insane person, so as to raise the question of scienter? Or, is it to be a matter of general repute, or the specific opinion of the Inspector-General or the finding of the justices?

If a person is "deemed to be insane," the procedure under section 22 must be followed. If he prove to be certifiable he must be sent to a hospital for the insane, or be committed to the care of a relative or friend. *There is no provision for sending him to a licensed house.*

Section 44, Act of 1903, patient may go to receiving house on remand or magistrate's warrant without their certificate when doctors called in differ.

If the medical practitioners do not agree as to the insanity of the person, he may be sent to a receiving house for seven days, and remanded from time to time for two months. But if they concur in refusing to certify there is no course but to discharge, and the patient will again be taken into an unlicensed house with the same procedure over and over again to be repeated.

Any person may gratuitously and out of affection or friendship take the care or charge of a lunatic without incurring any personal responsibility under the Act, but in such cases if it appears that the lunatic is not under proper care or control or is cruelly treated he may be certified and committed to an asylum.

Where any person "derives a profit" from the care of the lunatic he immediately becomes subject to the penalties in the Act.

"Derive a profit" means not necessarily a pecuniary balance of gain over expenditure, for that might depend on the ability and skill of the person to expend his receipts advantageously, and might excuse a person who received inadequate payment and starved the patient, and render liable the person who was paid liberally and treated his patient well. "Derive a profit" means derive any benefit or advantage, and would include enforceable payments as well as voluntary subscriptions, and would cover the case where no money passed at all.

The following are notes of two cases decided in England:—

The case of *R. v. Shaw*, L.R. 1, C.C.R. 145, arose in 1868, upon section 90 of the Act 8 and 9 Vic., C. 100, which prohibited any person

taking a *single* patient in an unlicensed house unless duly certified to, and the question was argued whether—

imbecility and loss of mental power arising either from natural decay or from paralysis, softening of the brain, or other supervening cause, if unaccompanied by frenzy or delusion of any kind, constituted "unsoundness of mind," so as to be within the definition of "lunacy" in the Act.

The Court held that imbecility arising from gradual natural decay of the faculties constituted "lunacy" under the Act.

The case of *R. v. Bishop*, L.R. 5, Q.B.D. 259, in the year 1880, arose mainly on the question as to whether "scienter" was necessary on the part of the person having the care of an alleged lunatic. This case was under section 44 of the 8 and 9 Vict. C. 100, which prohibited any one from receiving *two or more* lunatics without a license. It was admitted that there was one lunatic in the house covered by a license, and the point was whether other inmates suffering from "hysteria, nervousness, and perverseness" could be deemed "lunatics."

Stephen, J., says that the definition of "lunatic" in the Act as "every insane person and every person being an idiot or lunatic or of unsound mind" was sufficiently wide to include every person who is by reason of mental disease, or disease affecting the mind, in such a condition that it is necessary or advisable, at any rate, for his own good, to subject him to the restraint of a public asylum. If there is any difference between a lunatic, an insane person and a person of unsound mind, those persons of unsound mind, not being lunatics, must be such that it is necessary for their own good to subject them to that kind of restraint which is exercised in lunatic asylums over persons afflicted with insanity.

In this case the Court held that the "restraint" alluded to meant restrain *ejusdem generis* with that applied in asylums. The jury found the defendant guilty, and the Court determined that it was no answer that the accused did not know that the individuals were lunatics.

In private practice, the question which stares us in the face is—What are the rights and responsibilities of medical men to control their patients for the purposes of treatment? In other ailments relatives do their best to carry out instructions. Why they are unwilling to obey advice in mental maladies is difficult to say, though there are many factors which sway them, and in consequence numbers of cases become chronic. Ignorance, want of decision, and failure of application to those skilled clinically in the knowledge of the manifestations of mental unsoundness are largely to blame. The old bogey "stigma" has a deterrent effect in preventing early care. The disease is the stigma, and not the treatment as common interpretation has it. The marriage of other members of the family counts for delayed treatment, in addition to the possible spread of mental unsoundness, though I dare say if we got rid of all known heredity, and started afresh we should by-and-by be "as you were," that is, acquired neuroses by reason of work, overwork, no work, environment and habits would soon create a fertile bed for the production of symptoms of perverted function and disease.

The answer to the question of medical rights and responsibilities is really simple; the medical man gives advice and grants certificates, but the relatives do the rest. It is incumbent upon the physician, however, to state clearly the risks that are being run, and to impress upon the relatives that the responsibility lies with them. If a medical man honestly believes in an early recovery, and sends a case for care and treatment to

an unlicensed house with skilled attention until the case turns out certifiable, and is certified, why should the law come on the caretaker and the doctor? Technically, an insane person has been kept for pay, and the Inspector-General of the Insane with his battle axe of stupid law can prosecute when actually the condition is the same as if the patient had been treated at home without pay, and perhaps to his detriment until certified. Something must be done to ease matters in a common-sense fashion. The early treatment and prophylaxis should be under the medical care of those skilled in such knowledge, either under direct Government control, or in recognised private house properly staffed, and under notification, but not certified as insane. The notification being a form of certificate signed by the practitioner as to mental ailment or defect, filed in the house, and a copy sent to the Inspector-General of the Insane. Compulsory notification and supervision would be the key-notes. This certification would be for a period, and might be renewable on approval. Definite certification for licensed house or hospital would follow, or not, as the case may be, and would be determined by the Inspector-General in consultation with the medical attendant, no official visitors being permitted to visit. Those cases would be directly under the care of the medical attendant attached to the house, in order that no divided control of the staff should militate against the patient, and that a continuity of treatment with the responsibility thereof would be maintained. Where desired the relatives may request the attendance of a medical man of their own selection. By this means in such cases we may hope to get rid for ever of the wretched expression "deemed to be insane" of the present Act. Thus we may hope to reduce the numbers of occurring insanity, since in all such cases as I have instanced this is the only conservative treatment which is not hazardous. Such form of certificate from the doctor, together with a request from a relative as protects the house, and without which a patient may not enter, save voluntarily, by his own written request, would sufficiently safeguard the rights of property, and in some measure maintain the peace of families. In this way we shall definitely arrive at the facts whether actual certification is necessary, unnecessary, cruel, or injurious. Some form of certification in many cases does affect treatment favorably, absolute control being the first essential to treatment. The more perfect the legal control the more freedom the practitioner has for the treatment. This must be insured by proper legal methods; since to deprive any one of his liberty on incorrect diagnosis through insufficient observation is a matter to be studiously avoided, and the admission of such cases to licensed houses receiving the fully certified is not to be thought of. Neither should such licensee be permitted to have a house, separate though it may be, for the treatment of early cases.

The treatment in such sanatorium under notification would be in all respects as vigorously carried out to prevent insanity as for its care on full certification, and with the knowledge of control the case would be better treated. Some such scheme should be made law, because the treatment of the mentally afflicted by the inexperienced and under unsuitable conditions has developed to such an extent that something must be done.

Since legal formulary impedes early treatment surely some statute law such as exists for the State reception house might be made available for the approved notification sanatorium cases, and thus supersede the common law—alike for the benefit of the patient, the satisfaction of relatives, and the protection of the physician.

DISCUSSION.

DR. JONES (Melbourne) spoke on the difficulties in the way of non-certified treatment, and thought it would immediately do away with the utility of licensed houses, as no one would willingly apply for a licensed house if able to treat and receive patients without the latter being certified. The question of reconciling the "liberty of the subject" ideals with a system which permits of detention of an unwilling patient, without some legalizing method, such as certification, is a difficult one. Preliminary notification might be, for some time at least, a very difficult innovation, although it is certain that many recoverable disorders, such as puerperal mania, mild melancholia, or cases of transient mental aberration, should be treated, if possible, without certification. For the present he favoured the adoption of the Voluntary Board System for Licensed Houses. He thought also that it was necessary to give some legislative relief to the medical profession interested in licensed houses, and also to those who are relatives of medical officers in State institutions; their being debarred from acting as their own medical officers in the first place, or signing lunacy certificates in the second place, is absurd and vexatious. He thought it necessary to point out that the actions of the Master-in-Lunacy should not be feared, as it rarely happened that that gentleman had to intervene, and, when he did, it was necessary for the protection of the property of the patient and for the guidance of the relatives.

THE TREATMENT OF THE INSANE IN PRIVATE PRACTICE.

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With no wish to be controversial, but with every desire to ventilate a subject which should strongly appeal to all of us, my intention is to try and place before you the limitations and possibilities of the extent to which the profession is entitled to treat the insane—and their congeners, the increasing number of borderland cases—outside special institutions for the care and treatment of the persons who are under review. It has been my privilege for some nineteen years to have held the office of Lecturer in Psychological Medicine in the University of Sydney, during which time I inculcated the view, so true and eminently desirable, that the medical profession alone was qualified by law to sign certificates for the detention of the insane in registered institutions. This—a most serious responsibility—logically carries with it some knowledge of insanity and the borderland states. Every teaching body of repute has been compelled to recognise the importance of the subject of mental disorder—and here I wish clearly to differentiate between mental disorder and mental disease—not by any means for the purpose of their amelioration only, but for the more important purpose of their prevention. It must be obvious that, under existing social and legal

conditions, the treatment of the insane in private practice cannot but be within narrow limitations. I hope, nevertheless, to be able to demonstrate that such limitations are far too circumscribed. We hear a great deal of the stigma attached to persons who are certified as insane; and to avoid it is often possible, and always desirable, in these days when the smallest item is published on the housetop. At the worst, the fact cannot be hidden that a fair, perhaps a large, number of the insane must be cared for in institutions—those who, in hackneyed phrase, are likely to commit an offence against the law; those who are a danger to themselves and to others; and, from our special point of view, those who would be better under care and treatment. The whole question is, after all, largely one of ways and means. As, in most matters, money is the essential, and, desirable as are our institutions in the main, I know of no scheme so philanthropic as one which would permit of patients having, at least, a chance of avoiding certification.

In some measure, owing to the foresight and progressiveness of Dr. Eric Sinclair, Inspector-General of the Insane in New South Wales, there has lately been devised an annexe to the Reception House in Sydney, in which patients may seek or be given sanctuary, and be cared for medically. Certain kinds of cases are rightly excluded—such, for example, as the delirious alcoholic, the noisy maniac, the hopelessly demented. It is a *rest house*, in which the patient is given the opportunity of getting his bearings. By easy transition one is led on to speak—to us specially interested, at least—of mental wards in connexion with general hospitals. There cannot, I imagine, be two opinions that such are desirable; the great difficulty lying in deciding upon suitable cases. There is always a danger that such wards may be flooded with alcoholics; a class not, in any sense, fit to associate with the truly mentally afflicted.

First, the borderland cases, which every practitioner meets—the epileptic with morbid tendencies, the melancholic neurasthenic, the hypochondriac, the maniacal hysteric, the simple melancholic, and the simple maniac. Each and all are legitimately within the range of the general practitioner, and how well he plays his part is of great importance to the specialist who really specializes. Incidentally, I may say that I am often struck by the all-roundedness of the general practitioner. Those of us who essay specialism could often kneel at the feet of Gamaliel after reading the general practitioner's description of a case sent for further—but, often doubtfully, better—advice.

First, the epileptic—truly the *opprobrium medicinæ* of our profession. We give bromides more or less empirically, but, as so well said by Pliny Earle, "As we say our prayers, not expecting a literal answer," but we do give them. And there are good grounds for saying that, given intelligently, bromides, plus *régime*, make for much in the management of epilepsy and its morbid manifestations. We are all too familiar with major and minor epilepsy, less so, perhaps, with the "masked" form. We realize that the minor form is major in its mental effects, and that epilepsy in any of its forms may bear a medico-legal aspect. Face to face with an epileptic, our first thought is: Can we help him? Our second: Would it not be better to hand him on to some one else to bear the brunt of the failure which is unfortunately so often inevitable? Under any circumstances, it is always worth trying, and trying hard, to better the lot of the unfortunate who is suffering from the "sacred disease." Different patients, different treatment. I do not claim any prescriptive authority in this matter, but I do say that the "formal" treatment of Dana—that

advocated by Seguin, as described by Collins, and that of Wood, all of them Americans—deserve our serious consideration. Dana insists upon bromide of soda, glycerophosphate of soda, iron, and pepsin, a weekly “clearing-out” by suitable aperients, exercise, and warm baths to cause sweating and relieve tension.

As regards children, Wood certainly has much to commend his treatment by antipyrin and bromide of ammonium. All this may seem by the way, but the epileptic borderland means excitement, hallucinations of sight, and, eventually, the goal of all brain troubles—dementia. The arena of neurasthenia is so wide, and its ramifications so diverse, that cases in the borderland can alone be considered here. The melancholic variety has probably the best prognosis, because of the presence of a melancholic bias. The morbid mental symptoms—acute introspection, hopeless outlook, disturbed alimentary canal, lack of interest and objective—conform closely to those of simple melancholia, and demand similar management.

Hypochondriasis, neurasthenia, and hysteria—those bugbears of the intellect—in which sensations are allowed to dominate reason, and in which the altruistic emotions are disturbed, need more than medical skill, and little less than the miraculous, for efficient treatment. Which of us has not met this class of case, and, after pointing the way during laborious hours of listening to the imaginary woes—the oft repetition and tedium of which are well nigh unbearable—we implore the patient to get a grip of himself, and ignore sensations. To what effect? Usually none; for it is the old question of knowing right and being unable to do it. Such cases, however, deserve our most intense sympathy and care, for, unless they get them, they are an easy prey to the pirates outside our pale. Hysteria confronts us in the same menacing manner as hypochondriasis, and we are all compelled to admit failure in cases which, with better knowledge, should be amenable. But when there is a condition of excitement out of proportion to the other manifestations, we are “up against” a mania often difficult of management because of the underlying special disability. What may be done for such cases will be described in dealing with simple mania.

Of all morbid mental states, that of simple melancholia is the most common. Melancholia, says Clouston, is nearest to mental health, and in its lighter shades this is proverbially true. It ranges, however, from the mere clouding of spirits to a very nimbus of depression, in which the patient is utterly at odds with himself and his environment. Whatever may be the depth of the depression, there is almost always hope for the melancholic, because of the fact that some of the more important faculties of the mind remain intact, even though they may be working inharmoniously. A common clinical picture is that the patient has grown thinner, sleep is disturbed, both as regards quality and quantity, the alimentary canal is deranged in the direction of atonic dyspepsia, and constipation with light-coloured stools is the rule. The mental side shows alteration mainly in loss of direction of the will, not in loss of will power, which has for its corollaries indecision, lack of interest and attention amounting to marked indifference, inability owing to morbid introspection to concentrate thoughts, and possibly interference with memory. Against this is the supreme fact that in most cases there is no lack of mental power, and any supposed defect of memory is due to the lack of attention in recording and registering impressions which, obviously, not having been recorded, cannot be recollected. The patient’s judgment regarding himself is often poor, and considering how little the intellect is interfered

with, remarkably so, but it is only in so far as it affects himself. He inclines to hold himself too cheap; in effect, he is a better man than he knows, but his judgment concerning matters outside himself retains its normal strength. The emotional side may or may not show aberration. Suffice it to say that the emotions as affecting conduct are often an index of the depth of the depression. The melancholic *par excellence* is, with one or two disclaimers, capable of being treated extramurally. Every melancholic is a potential suicide, and the cases are often of long duration. This implies more or less constant surveillance, and also money—two eminently practical considerations. Any well-equipped private hospital should be competent to undertake such cases, and in this connexion it will be well to insist that, generally speaking, home treatment is unsatisfactory and undesirable. Not that it should not be essayed if removal to a better environment be impossible; the whole thing resolves itself into a matter of what is best and what is next best. Most melancholics show some evidence of malnutrition, and among the many wise dicta of Clouston there is none more true than that of the “doctrine of fat.” So much so, indeed, that one may say, as a rule with confidence, that no stable improvement can be expected until there is a definite and progressive increase in weight. Good feeding, wise nursing, healthy environment, all contribute to this end. Rest in bed for most of the 24 hours is desirable, for at least two reasons, namely, that rest conserves energy, and that supervision is easier, apart from the fact that it is well for the patient to realize that he is ill.

In speaking of drug treatment, I know I shall join issue with many alienists; but the faith that is within me is strong, and I am old-fashioned enough to believe in therapeutics well directed. To begin with the *primæ viæ*, I hold with Collins, of New York, that against all comers calomel holds first place as an intestinal disinfectant, not in large doses, but in quantities small enough to satisfy even the homœopath. One-sixteenth of a grain, morning and evening, is enough, and if additional disinfectant be required, sulphate of soda comes next. Constipation being the rule, it may be necessary to use a tonic laxative, an inducer, rather than a producer, of intestinal relief. A favorite pill is one containing aloin, cascara, belladonna, and nux vomica, given, say morning, noon, and night, with, if necessary, the assistance of sulphate of soda in doses first thing in the morning. But to take the keen edge off the depression, which is usually at its worst in the morning, opium stands supreme. That it fails sometimes cannot be denied, but in most cases benefit is derived almost immediately, and the patient begins to get glimmerings of hope, which in full fruition bring respite from a state of misery, and eventually cure. In what is now a classic—Bucknill and Tuke’s *Psychological Medicine*—opium is recommended in combination with sulphuric ether in doses much larger than seem necessary in these latter days. The opium had its own special work to perform, and the ether was mainly an adjunct in the direction of rapidly diffusible stimulation. Whether or not it be a fact that we are not now able to stand the same amount of sedative and stimulant as were our forefathers, in my opinion, larger doses of opium are as unnecessary as they are undesirable, and ether is but rarely required. Of all the opium preparation, the best, perhaps, is nepenthe, as prepared by Ferris, of Bristol. It is well to combine with it some nux vomica and liquid extract of liquorice, filling up with a tonic such as compound tincture of gentian given diluted after meals.

It may be advanced that a considerable element of danger exists in using opium under circumstances in which such definite and pleasurable

results are experienced, but in one instance only has that occurred in my practice. It is true that until complete recovery is brought about patients "miss" the medicine (should it be denied them for any reason) which enables them to see things as they are, rather than as they seem to be. In effect, opium has the beneficent quality of assisting in changing the patient's point of view to his advantage. The question of sleeplessness is too large to enter upon in any detail, but it may safely be said that with the opium treatment it is less acute, and more easily managed. Of the hypnotics—too numerous to mention—the best and the safest is paraldehyde. Patients rarely become devotees of so nauseous a drug; it is in no sense a depressant, and may be given whilst in bed in doses of ʒi. to ʒvi. with an equal quantity or more of rum, brandy, or whisky, or in Martindale's formula; Chlorobrom (Martindale), veronal, sulphonal, trional, &c., are all useful in their place, but, except as variants, should not take that of paraldehyde. But one cannot in justice refrain from mentioning bromides in this connexion. All insomniacs are the better for being sedated during the day by small doses, say, 15 grains thrice daily well diluted, and there is practically no choice as to whether it be of potassium or sodium. Again, as recommended by Sir James Sawyer, of Birmingham, one drachm doses at bedtime may be successful alone, and may be continued for months. Lastly, in this connexion I would like to advocate what has been described as "Neptune's Girdle." It consists simply of a wide bandage of a well-damped cloth wound round the waist and covered with a turkish towel. In this the patient goes to bed, and very often, to sleep. Warm baths need no advocacy.

Simple mania, which may easily be mistaken for early general paralysis, is quite within the range of ordinary practice, provided the conditions required are at hand. The main difficulty is that of control, for such patients, by reason of the lack of direction of will power, and an apparent, though far from real, abundance of vitality, are inclined to be somewhat noisy and restless. The physical state in most cases is like that of the melancholiacs, but there is a greater tendency to early exhaustion. The general treatment is the same. But opium is not, in my opinion, advisable in any form. In its place there is nothing comparable to sulphonal, in sufficient dosage to soothe and modify, as it were, of the transports, and not to the extent of marked chemical restraint. In exhibiting sulphonal, from 15 to 30 grains may be given from twice to thrice daily, according to the needs of the case, and this may be continued for months. It is best given in hot fluids, and some form of effervescing water used as a beverage during the day. It is well to have a one day a week in which the drug be discontinued. Under these circumstances, I have never seen any disability beyond slight ataxia, which soon disappears, and hæmaturia has never occurred.

Delirium calls for short mention, and the old rule remains true, that when there is delirium and fever the state is but a borderland one; should, however, the delirium persist after the fever has abated, the condition may be looked upon as one of insanity. Perhaps the best example of delirium may be found in relation to the abuse of alcohol. The *casus belli* here is quite definite, and fortunately the effect is usually evanescent. The primary considerations in such cases are stoppage of the toxic, feeding, and sleep. I do not hold with those who believe in tapering off the alcohol, although the usually flabby heart needs toning by some substitute. A useful combination for this purpose will be found in strychnine, aromatic spirits of ammonia, and red cinchona bark, given frequently. Liquid food

is required in large quantity for the purpose, apart from that of nutrition, of flushing every avenue—kidneys, bowels, skin, and breath. For sleep, again paraldehyde, followed, if necessary, in an hour by chlorobrom in ounce doses. This almost invariably causes satisfactory sleep, and may be given in the daytime as well. To clear and disinfect the bowels, there is nothing better than calomel and sulphate of soda.

It is not within the terms of this paper that anything be said specially concerning private hospitals, except in so far that they are pertinent to the matter in hand. That the management of borderland and insane cases is usually better in the hands of others than their own friends goes without saying. A hospital well equipped by reason of site and environment, a wise matron, and a staff of nurses chosen for their tact and sympathy, rather than for their academic qualifications, are the greater part of the armamentarium required. Given such conditions, then the cases described may reasonably be treated with a good, or even better, prospect of success than in any registered institution. In this relation, I cannot do better than quote Wilson (*Vice and Insanity*)—

“ We may begin by saying that, in all cases, home treatment, by which it is assumed that extramural treatment is included, is to be preferred, provided that it can be efficient. We may also say that, for all purposes which may be generally described as tonic in the sense of nutritive, treatment in a carefully selected private house is better than asylum treatment. But at the risk of being supposed to express a prejudice in favour of specialists, we must promptly add that mental skill in mental diseases on the part of the physician in charge is a *sine qua non* of treatment in a private dwelling. The physician must be expert in mental science; he must be a student of mental states; he must know the significance of what the patient says and does; he must be familiar with the treatment, dietetic, tonic; and moral, appropriate to the malady. A physician ignorant of these things who attempts to treat a mental case is, in my opinion, acting criminally. I do not see how the practitioner can ever hope to prevent insanity in his flock until he understands how the insane minds work, and knows what way madness lies, and diverts his patients from it; and one is inclined to say of nearly every case of insanity (which is not congenital or paralytic) that it might have been prevented had some one been at hand who knew how to observe mental facts, and how to minister to disturbed thinking and feeling.”

At the worst, should certification become necessary, there is always the twofold satisfaction that the patient was given a chance, and a good one at that, and, further, that the friends are absolved from having hurried certification. The manner of treating patients in licensed houses, and even hospitals for the insane, is of some importance, for if they were permitted to receive non-certificated cases of a voluntary nature, much would be gained, and the number of certificated insane would not loom so large. I have already hinted at the main requirements. The gain would be great if incipient cases, and those which are curable within a reasonable time, could enjoy the privilege of non-certification. But this course should be strongly safeguarded by instant notification to some properly constituted

and competent authority, who should have the power to veto private detention if, in his view, such were not competent or desirable. To care for the insane privately demands conditions not quite in terms of those obtaining in private hospitals, for reasons stated, and the inspecting authorities, after notification, should also have the power to insist upon the necessary safeguards—by which I do not mean bolts and bars, mechanical restraints, or seclusion—but good housekeeping, a quiet neighbourhood, ample ground, and avoidance of anything suggestive of durance. Even then there are some disadvantages still attaching. Patients in private hospitals have not, strange though it may seem, the same amount of liberty as in hospitals for the insane; they lack the same amount and variety of recreation in the true sense of that word; nor have they as much amusement; and, further, they do not have the same amount of acute medical observation bestowed on them; and discipline—a most important feature—cannot be enforced. Esquirol calls the asylum “that instrument of cure”; and which of us is there who is familiar with hospitals for the insane who has not verified over and over again the fact that, almost from the moment of admission, ameliorating signs express themselves? The disordered mind realizes at once that order and decorum are the rule and norm in every particular; and, therefore, new arrivals fall into line with a ready acceptance of the new and better conditions.

THE LEGAL DUTIES AND RESPONSIBILITIES OF THE MEDICAL PROFESSION IN MATTERS OF LUNACY.

By T. PROUT-WEBB, K.C., Master-in-Lunacy, Victoria.

The object of this paper is an endeavour to suggest for the consideration of the medical profession certain aspects of their legal duties and responsibilities in matters of lunacy.

It may be well, at the outset, to state definitely that the medical practitioner has in cases of insanity no greater privilege or protection than is extended to the ordinary layman, except such as is expressly conferred upon him by the statute law. Yet how often do we find that he overlooks this, and with the single eye to the relief or cure of his patients assumes or directs the custody and control of a person mentally afflicted, and regards him as an individual bereft of his ordinary rights and privileges. No doubt he acts with a large heart, and with the best of intentions, and does that which humanely and medically is, in his opinion, the best for the patient, and accepts, perhaps without thinking of it, the responsibilities of the situation, with never a conception of the risks he runs or of the possibility of having to defend an action for assault or false imprisonment. Yet it is a matter worth pausing to consider, not only from his individual standpoint, but as one intimately affecting the larger questions of the treatment of the actually insane, or of those whose condition is on the border line of insanity. To rightly appreciate the importance of the consideration, I venture to put before you a statement of the matter as it presents itself to the legal mind.

Accepting the fact that an individual is suffering from some form of mental disease, one of the first and most important considerations for

the medical practitioner who is called in is to decide what is to be done with the patient, and, particularly, can he be safely and properly treated without certification.

Primarily, the functions of the medical adviser are, by advice and treatment, to attempt the relief or cure of the malady; incidentally (and I might almost say in nearly all cases of mental disease "necessarily") this may involve some interference with the exercise by the patient of his rights and liberty, and the free exercise of his own will. Ordinarily the patient is free to adopt or reject the advice; if he is sufficiently of sound mind he may voluntarily place himself under the control of his medical attendant, who would then be justified in interfering with his rights to the extent to which it would be reasonably necessary for the purposes of treatment—but not further. Persons standing *in loco parentis* to the patient, too, may safely commit him to the control of the medical practitioner to the like extent; but in all other cases, such as those in which near relatives or friends act, the medical practitioner may not protect himself under their authorization. Where, from the very nature of the disease, such as lunacy, the patient is either quite incapable of expressing his voluntary desire for treatment and of surrendering his free will, and where, as in most cases, he is resistive to it, the physician, making control part of his treatment, has to bear the responsibility of so dealing with him, unless he acts strictly within the prescribed law.

The position may be regarded from three points of view:—

1. The legal, which cares only for the due and proper care and protection of the person of the patient and of his estate, and provides for the well-being and requirements of society.
2. The medical, which views the case from a remedial standpoint only, necessarily including the care of his person.
3. The sentimental, which regards only the feelings and susceptibilities of the patient's family, caring only to a minor degree for the personal treatment of the patient, and often entirely disregarding his advantage or best interests.

1.—THE LEGAL POSITION.

This regards primarily the inviolability of the liberty of the individual, and, secondarily, the protection of his interests.

Except in infancy, under the age of 14 years, where the personal liberty of the individual is entrusted by law to his parents or guardian, every person of sound mind has a natural right to his liberty, and to the unrestricted enjoyment of his freedom of will and self-control, and, by the common law, none may, as a general rule, interfere with it. This natural right is, of course, subordinated to the general welfare of the community of which the individual is only a unit, and is interfered with, checked, and controlled by the State in many directions—not only is this done in cases where the individual voluntarily provokes action by committing a breach of the law, but in cases in which he is an involuntary victim, as where he contracts a dangerous infectious disease, such as small-pox. Lunacy is another such condition, in which the law controls the individual for his own protection and for the welfare of society.

This interference with his natural rights may be effected directly in the manner prescribed by the Lunacy Acts, or may be justified to a limited degree under the common law.

The statute law prescribes certification as an absolute and indispensable preliminary. There is no authority at common law for one or two men, be they medical practitioners or not, to say or to certify that another is a lunatic and so justify taking him and depriving him of his liberty unless he is, in fact, insane. Every person, whether a medical practitioner or not, may justify control exercised by or directed by him, in cases of actual insanity or delirium tremens, by showing that such control was reasonably necessary, either to cure the individual or to restrain him from doing mischief to himself or others, thus far he may go—but no further. Except as provided by statute law, the medical practitioner, no matter how expert he may be in diagnosing mental conditions, has no recognition different from, or superior to, the ordinary layman.

Such are the very limited restrictions of the common law, which, in cases only of "actual" insanity, narrow the right of any person to interfere with the liberty of another, and similar limitations will be found in the statute law.

The Lunacy Acts have, however, enlarged the field of control by giving the right to the State, but to no one else, to actively interfere with the liberty of the individual in certain cases where the insanity is not actual and manifest, but is incipient or suspected only.

When a person is only "deemed to be insane" he may, under certain conditions be apprehended, that is, when he is without sufficient means of support, or when he is wandering at large, or when he is discovered under circumstances that denote a purpose of committing some offence against the law. In other cases, too, when the person "deemed to be insane" is not under proper care or control, or is cruelly treated or neglected by any person having or assuming the care or charge of him, he may be apprehended, if it appear to a justice, after a personal visit, examination, and inquiry, or upon the report of a medical practitioner that he is insane. In such case, if a medical practitioner subsequently certifies that he is only apparently insane, but that the symptoms are not sufficiently marked to enable him to certify that he is actually insane, he may be deprived of his liberty and sent to a receiving house for treatment, and his condition thereby ascertained.

In all other cases, however, as well under the statute as the common law, the fact of "actual" insanity must be first established before any interference with the liberty of the person can be justified; and when we find a condition of less than actual insanity, there is no legal justification whatever for the interference by any individual (medical practitioner or not) with the liberty of another, or for controlling him in any way for treatment without his consent; and the advocacy by some alienists for some sanction for such an interference, however necessary or advisable it may be for treatment, is too dangerous an invasion of the principles of the law to be lightly considered, and too open to abuse in its practical application to justify its adoption without every possible restriction and safeguard being prescribed. As I have mentioned, the Legislature has moved with a very cautious step in this direction, and has kept the right to use it in its own hands, and has wisely confined it to admissions to institutions under its own supervision and departmental control and responsibility.

The legal position that I have endeavoured to make clear has frequently been unappreciated by medical practitioners, and in many, so-called border-line cases, they have, with the best intentions, ignored the position and undertaken the attendant risks. The patient, if he recovers,

either from his thankfulness for his restoration to health or supineness may disregard the breach of the law and the technical wrong that has been done to him; while, if he does not recover, his subsequent certification and admission to a hospital or licensed house may overshadow his previous position and, to some extent, justify the acts of the medical practitioner. Regarded from a legal standpoint, this position should certainly not, in the interests of the medical profession, be tolerated.

The fact of an insane condition, sufficient to justify control or interference should, by some means or another, always be clearly established and recorded before any control or interference whatever is sanctioned by the law.

Certification is the method adopted by the law to establish the fact of actual or presumptive insanity, and this should be insisted on for the protection of the individual and the justification of the person responsible for the control or interference.

Certification in itself merely means the establishment by law of what is deemed sufficient *primâ facie* evidence of the condition of insanity sufficient to justify control. It does not in itself establish beyond all question the fact or the condition of insanity, and unless it is acted upon and taken as a basis for admission to an institution it is ineffective.

A certificate may be given by any medical practitioner, whether he have had any training or experience in mental disorders or not, so long as he acts *bonâ fide* and with reasonable care, according to the average medical knowledge in such matters. Reasonable care means considerable care, and want of reasonable care means negligence. Reasonable care imports a due and proper personal examination of the individual, and the making of such inquiries as are necessary, and which a medical man ought, under such circumstances, to make. The opinion that the person is insane may be formed upon the personal examination alone, and further inquiries may not be necessary—the medical practitioner is not bound to make them if he is satisfied on the personal examination. If the facts observed by himself are not sufficient for him to form his opinion then he is bound to make further inquiry, but he may not form his opinion only on facts communicated to him by others.

He may form his opinion upon the statements made by the person under examination—a certificate based “upon conversations I have had this day with her” has been held sufficient in law—without the actual statements being recorded on the certificate; but, in my opinion, this is an extreme case, and when the purpose and object of the certificate is considered, I think the medical practitioner should, in all cases, be more precise and particular in complying with the statutory requirements, and that such detailed facts should be set out as upon their face would indicate that the opinion was well formed.

The prescribed form of certificate merely gives expression to the “opinion” of the medical practitioner, and that may be disputed. In itself it is inconclusive, and can cast no stigma upon the individual—that stigma which is so much relied on as a thing to be avoided, and which, in fact, only arises, if at all, when the certificate is acted upon by the admission of the patient into a hospital for the insane. The certificate itself—by itself—is perfectly harmless until it is acted upon by some person who, relying on it, prefers a request, in writing, for the admission of the patient to a hospital for the insane or a licensed house. It is the action of the relative or friend who makes the request and accepts the

responsibility, that gives any life or force to the certificate, and makes it sufficient *primâ facie* evidence of the insanity to justify the superintendent to admit and control the patient.

The law does not prescribe that every insane person shall be certified—many of the afflicted are cared for, treated, and die, without certificates. Any insane person may be cared for and treated in his own home, with his family, or in the house of a friend, who derives no profits from it—otherwise he must be certified.

The certificate may be defective or bad in law, but that does not destroy the common law right to restrain the individual, if, as a fact, he is actually insane.

It is a confusion of ideas to speak of certification as in itself in any way objectionable. It is merely prescribed as the simplest and safest method of recording the *primâ facie* evidence, on a medical opinion, that the person is insane and a proper subject for detention and treatment. It is the admission into a public hospital that, being public, may stamp the patient with the mark of insanity.

Now, in order to elude this stamp, where the condition of insanity is undeveloped, and either minatory or uncertain, and at the same time sufficient to justify interference when control is necessary, some course of action is desirable.

On the one hand, we have the medical view that for remedial purposes the earlier the treatment the better the curative results; on the other hand, we have the jealous guardianship of the law of the rights of the individual. There is also to be taken into consideration the social effect upon him and his family. To weld these diverse considerations into a system which will provide for the maximum benefit to the individual and the minimum of interference with his rights is, no doubt, a vexatious and difficult task. Many schemes have been devised, but they all turn ultimately on the pivot of the protection of the individual, and the medical and social sides of the question are subordinated. I have referred to treatment in the individual's own home, or in that of a friend, as permissible without certificates; but the great majority of cases require treatment elsewhere, and following the safe lines sanctioned in cases of this class by the Lunacy Acts it appears to me that they should only be dealt with under some prescribed method of recording the condition, and in some prescribed place under the supervision of responsible authority.

The secondary position from which the legal position regards certification is the care, preservation, and administration of the estate of the insane person.

It has been the prerogative of the King to preserve and administer the estates of idiots and lunatics, and is exercisable now, through his Courts of Justice, where action is sought in cases of all such persons, whether patients in a hospital for insane or licensed house, or not.

In the case of patients its exercise is by Statute deputed to the Master-in-Lunacy, who is required, as a matter of duty, to undertake the personal care, protection, and management, or supervision of the management, of the estates of all lunatics and lunatic patients, and to take possession and care of, collect, preserve, and administer the property and estates of all lunatic patients.

Here it may be noticed that the operation of this interference is limited to those cases in which the fact of actual lunacy is established, or in which the patient is in a receiving house, and does not arise under any less modifications of the mental condition. In cases before the Courts.

the fact is made certain by inquisition; in cases under the Master, the fact has been established by the certification of the patient, or by certificates in other cases when the lunatic is neither a patient nor under the orders of the Court. In incipient or border line cases the interference does not exist, nor does it exist where the lunatic is treated in his own home. In none of these cases is the fact of insanity either ascertained or recorded.

In order that the interference of the Master-in-Lunacy in the regulation and disposition of estates may be clearly and fully understood it may be thus stated.

There is a popular delusion that upon certification and admission to a hospital for the insane or a licensed house, the Master takes the estate, sells it, and applies the proceeds to the maintenance of the patient, and, presumably, confiscates the balance for the purposes of the State.

What actually occurs in practice is this:—

If the patient is in a receiving house, or in a hospital or licensed house, no active steps are taken pending the ascertainment of the condition of the patient, his prospects of recovery, and the desirability, if any, for protection or prompt action. Should it be made apparent that the Master must act, inquiry is made, and the protection of the estate and the interests of all parties concerned in it (the patient, his family, and creditors) are carefully conserved. If it appears that his affairs are in the hands of a capable administrator, in whom the patient had reposed confidence, that situation is continued unchanged, subject to supervision by the Master—so long as he considers the patient's interests are in no danger. If his affairs require investigation, that is conducted, and when placed in a condition of safety and on a proper basis, the Master may allow the wife or son to manage the estate, subject to supervision. If, however, an active control and management requires to be undertaken, the Master himself takes possession and actively administers. He then acts as and for the patient, protecting and providing for the family of the lunatic or others theretofore dependent on him, applying such sum as is reasonable, under all the circumstances of the case, towards his maintenance, and holding the balance in trust for the lunatic, or, if he do not recover, for his next of kin.

The Master is but a trustee—but with somewhat wider personal obligations to protect and provide for the wife and children of the patient than an ordinary trustee.

One of the objections to certification is that it vests in the Master the control and administration of the estate of the patient, and this objection is not always absent, even from the mind of the Medical attendant, and is in some cases a deterrent to the friends and relatives; but in every case wherein it has been apparent a personal explanation has removed it, and it has been welcomed as a beneficent provision. On the recovery of the patient, the confusion of his affairs brought about by his actions while of unsound mind has been removed, complications straightened out, and he returns to find everything smoothed for him, no difficulties to worry him, and nothing, from a business point of view, to disturb his convalescence.

2.—THE MEDICAL POSITION.

The second aspect in which the patient is considered is the Medical one of treatment.

This, as I have pointed out, connotes detention and control, or the interference with the liberty and free exercise of the will of the individual,

and I have stated the limitations under which this may be lawfully exercised. Under these conditions the medical adviser, acting *bonâ fide* and with that skill and reasonable care that may be expected from the average Medical Practitioner, is protected.

When a Medical Practitioner is duly registered the inference is that he is competent, and his treatment correct, until the contrary is shown.

In the specialist, however, a higher standard of care and competency is required.

But in every case the use of restraint greater in degree, more severe in character, or longer in duration than is necessary for the security and care of the lunatic, is an offence at Common Law, and punishable by indictment.

Where a patient is certified and passes under the control of the superintendent of a Receiving House or Hospital for the Insane, the treatment by the General Medical Practitioner is at an end. When, however, the patient is admitted to a Licensed House he may continue to influence treatment as a consultant, but even then the treatment is liable to be affected by the patient's ability to pay for it. Medical Practitioners are not philanthropists by choice, although, in many cases, they are compelled to accept that situation and perform services and effect cures without receiving their just dues. Treatment in a Licensed House is an expensive matter, and many who can afford the expenditure for a limited period, in the hopes of a speedy cure, are unable to meet it for a protracted period. Medical Practitioners do not, as a rule, inquire into the means and ability of a patient to pay, but attend in the reasonable expectation of their fees being met, being more professionally interested in the medical aspects of the case, and the hope of being able to relieve the patient. In Licensed House cases, where the expenses are being defrayed exclusively out of the patient's own estate, it is, therefore, customary, where it is apparent to the Master-in-Lunacy that the expenditure on medical attendance (other than that provided by the Act) cannot be justified, to give the consultant notice of it—leaving him to elect whether he will continue to attend with the possible prospect of receiving no fees for it.

In cases where the mental condition is not so advanced as to require certification, the medical treatment, and the relations as between Physician and patient in ordinary cases, holds good.

The question of certification is one of importance, personally, to the Medical Practitioner, inasmuch as it affects his continuation of particular treatment; but so also does the condition of the patient's means, and the opinion of the patient or his relatives—who may discontinue his services—and, therefore, this interference may not be regarded of so much importance as in itself to render certification objectionable. But so long as the condition is less than certifiable the medical attendant should have every facility for pursuing his treatment compatible with a scrupulous protection of the rights of the individual.

How this should be effected is, as I have said, a difficult problem, and one which, though cognate to the subject of this paper, would take too long to discuss.

3.—THE SENTIMENTAL POSITION.

In considering the third aspect in which the condition of Lunacy may be regarded, the "Sentimental" one, the mere contemplation of its attributes indicates how inferior in importance it is to either the Legal or the Medical.

It is directly in conflict with the Legal, and is only slightly in harmony with the Medical, so far as its influence affects the sensitiveness of the patient; otherwise, it is merely a selfish consideration founded upon ignorance. It is the last trace of the ancient and unenlightened aspect in which Lunacy was regarded a hundred years ago—when the disease was a thing to be avoided, the sufferer shut away from the eyes of men, and he and his ailment covered with the secrecy of a cell. It has no sympathy with modern thought and research, which regards Lunacy as more than a mental disturbance, more than a mysterious visitation, and recognises it as much a disease and curable as any fever or small-pox. To quote Dr. Ford-Robertson:—"The modern theory is that insanity depends upon the action of various poisons upon the nerve cells of the brain that subserve the association or intellectual functions, and those are apparent in inherent predisposition or in toxic action. The first is the most difficult to deal with, in the latter arrest or prevention is possible more easily. Some toxins are introduced from without, as, for example, alcohol; others are generated within, due to bad hygiene, bad alimentation, influenza, &c. When we understand the nature, sources, and causes of the formation of the various toxins, and their mode of elimination, most forms of insanity will be curable."

If this statement could be widely disseminated and appreciated the old bogey, the old slur or stigma, would no longer hamper the action of the medical practitioner.

People do not shun the publicity of typhoid, small-pox, or influenza—diseases as common as lunacy, and not more dangerous to the health of the community. Relatives offer no objection to notification in those cases (much the same as certification in lunacy), nor to the removal of the patient to a contagious diseases hospital, or to a sanatorium for consumptives.

If they knew more of the true nature and causes of the disease of insanity, it would not be so repellant, and the treatment of the ailment, in its earlier stages, would be greatly facilitated. Its advent would be earlier recognised, its prevention effected, if only the old prejudices, the old ignorance, with its accompanying desire to secrete the patient and hide from the knowledge of the world the fact that he has contracted the disease, were destroyed.

The sentimental aspect of insanity should be disregarded and crushed out as a mischievous factor, and with the radiant light of medical research and treatment cast upon the ailment, showing its true character, the community would be educated to recognise the disease without the repugnance it now does, and to feel confidence in the Medical Practitioner's methods, aided by a wise and carefully guarded legal protection.

THE PSYCHOLOGY OF CRIME.

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Great changes are taking place in our views as to the nature of crime, and in our methods of dealing with criminals, and even greater changes seem impending in the near future. That there is a close connexion between some forms of crime and mental disease has long been admitted,

but it is only in recent years that we are beginning to understand how near the connexion is between abnormal mental states and the great mass of criminals. Members of the medical profession are often called upon to advise as to the mental condition of persons accused of criminal acts, or who have been actually convicted of such actions, and they are supposed to be able to indicate the responsibility of any person brought before them for examination. The time seems fully come for people who deal with accused persons in our law courts, and with prisoners in our gaols, to give more careful attention to the psychology of the criminal than has been done in the past, so as to enable future changes to be based on more sure foundations than has been done in the past. Most persons will admit that mind and matter are totally different the one from the other, and that the one cannot be translated into the terms of the other. They will also admit that there is a correlation between the actions of mind and brain, and that when changes take place in the one, we must postulate changes taking place in the other. We do not always realize that the correlated changes take place as surely in moral and volitional activities, as in those connected with the intellect; or, in other words, that there are brain centres subtending all activities of moral nature, or of the will, and also that want of development, or disuse of the brain centres, must cause corresponding changes in the moral nature or of the will of the person so affected. It has been remarked by an American authority that "on the borderland of lunacy lie the criminal population." And this, indeed, is a borderland, where it is most difficult to bound the region of the mentally affected from that of the law-breaker.

The extension of education to all classes of children has drawn attention to a number of children who are backward or defective. They are unable to keep up with the general work of the class, and are either neglected, or become a drag on their class-fellows. In many cases it is found that the backwardness is due to some bodily defect or disease, such as partial or total deafness, short-sightedness or other eye trouble, post-nasal growths, and many other defects of body. Under proper medical treatment, the majority of these cases can be so far freed from their defects as to be able to continue their education on equal terms with other children. Besides these bodily defective children, there are a number of others whose backwardness is due to want of development, or disease of some portion of the brain, which is the material basis of mental action. These children, we say, are mentally defective. In some of them can be found the stigmata of degeneration, such as the ill-formed ear, the abnormal palate, additional fingers or toes, irregular teeth, and general want of tone of body; but in others no outward departure from the normal bodily type can be detected. Mentally, some have enfeeblement of all parts of the mind, while others are defective only in some special region, such as the intellect, the emotional or moral faculties, or the will. These backward children form a class that comes between idiots and imbeciles on the one hand, and the normal type of children on the other. They cannot, and should not, be brought under the Lunacy Act, or any future Act for dealing with idiots, but they require special training and control, because a not inconsiderable proportion of our criminals springs from this class of children. Mr. Walfer, of Minnesota, says "that in the prison of Stillwater, out of a population of 675 prisoners, he considers that 122 were degenerate incorrigibles, who ought to be set apart as a class by themselves, and treated as such, and that in his opinion, one-fourth, and possibly one-third, of all adult convicts found in the State prisons are similarly affected." In these numbers, he does

not include prisoners who were actually insane at the time of conviction, or found to be so immediately thereafter.

Many people cannot be brought to believe that there are children who are moral imbeciles—in other words, that we meet with persons whose intellectual faculties are normal, but whose moral natures are so defective as frequently to bring them within the action of the criminal law. These moral imbeciles have come under my notice on many occasions, and are very interesting, not only as a study in themselves, but also in the clue they give to the study of criminal psychology. One case that was very marked was that of a boy of about eleven years, son of well-to-do parents. There was no history of nervous disease, or of alcoholism in the family, and nothing as far as was known in the way of injury to the boy before, at, or after the time of birth. He was the eldest child; the other children, girls, were in every way normal. There was nothing special in the history of his childhood; he got his teeth, walked, and spoke at about the average time. As he grew, he seemed to be bright and intelligent; the only thing noticed was that he was more restless and changeable than other children. He was not specially passionate or violent in temper, his habits were clean, and it was not more difficult to keep him clean than it is generally found to be with children. As he grew older, religious subjects interested him; he liked to sing hymns, read the Bible, and talk about his own religious feelings. He was cruel to younger children and animals, was very untruthful, even when there was no special reason for concealing the truth, and stole everything that struck his fancy. This he did, when he could have obtained similar articles at home by asking for them. His school reports for work were generally good, except that there was often difficulty in getting him to keep his attention fixed on the special subject of study. Punishments both at home and at school for moral delinquencies were frequent and useless. On examination, I found him a well-formed and well-grown boy, and there were no stigmata of degeneration in any of his organs or members. Questions were answered in a bright and intelligent manner. He at once admitted his faults, seemed to understand the great need that these failings should be overcome, and readily promised to try and overcome them. When next seen, a few days afterwards, I learned that no change or improvement had taken place in his conduct, and the same report was made to me from time to time for the two years he was under notice. Careful psychological examination made it clear to me that the chief lesion was in the will. The boy understood that his conduct caused pain and grief to his parents, and brought trouble and punishment on himself, and he seemed desirous of doing what he knew to be right, and leaving undone what was wrong, and still when the temptation came to him, he was unable to resist it; and as these habits were unrestrained, they became stronger, and passed more from the feeble control of the volitional centre. It was thought by some that he had a strong will, and that this must be broken and controlled before improvement could be hoped for, and the boy was treated on this supposition with unsatisfactory results. Two other children of the same type afterwards came under my notice, and examination in these cases strengthened the opinion that the chief lesion was in the volitional centre.

The authorities of the Industrial Schools Department have often found considerable difficulty in dealing with some of the children committed to their care, whose peculiar mental or moral natures differentiated them from the general type of children. Those who were found to be idiots were transferred to the Lunacy Department. After these were removed, it was found that a considerable number still remained, for whose care and

training some special methods seemed necessary. It was suggested that a separate division should be added to the Kew Idiot Asylum, or a special institution established for them, but as money was scarce in those days, the whole matter was allowed to stand over.

I was consulted on various occasions about these children, and made many examinations into their mental states. Some, though not certifiable under the Lunacy Act, were below the normal standard, but in many others the intellect did not seem markedly defective; it was the moral faculties that caused the trouble. Here, again, the volitional centres seemed feeble to a marked degree, and capable of exercising but imperfect control over the passions and appetites. These children had generally been reared under unfavorable moral conditions, and had only come under control of the Industrial School Department at an age when the mental and moral faculties were more or less formed on definite lines. I have examined criminals who seemed to be grown-up members of the same class, many with a more or less defective state of the mental organization, though not to such a degree as could be certified as insane; others again with fair intellects, but with degraded moral natures, and feeble wills. It is, in my opinion, a mistake to confound criminals with the insane, but it is necessary to remember that the degraded moral natures and enfeebled wills of most criminals are correlated to, and depending on, degenerative changes in certain brain centres. We can learn much criminal psychology by careful study of the classes of children and young adults referred to in this paper, and how can we hope to deal properly with them, except we make full examination of their mental states. Psychology is to the mind what physiology is to the body; our medical students are well trained in the latter, and are left very much to untrained ideas and imaginations in the former.

Training can do much for idiots and imbeciles, and can do still more for defective children. Special schools or institutions for these last-named would do something, perhaps a great deal, to lessen crime and immorality. The first practical step would be to have a careful study made of all defective and backward children in the State. This should be done in schools, reformatories, prisons, and, when the parents would co-operate, in private life. The information so obtained would enable definite action to be taken for special training, and, when necessary, for some form of control. To me, it seems that the chief lesion in almost all criminals is to be found in the undeveloped or degenerated centres of volition, and our penal system tends to lessen rather than to increase the activities of these centres. There are great practical difficulties in arranging any prison system which will encourage free action of the will, but, in America, we find that not altogether unhopeful efforts are being made in that direction. At any rate, a full and careful examination of the criminal from the mental stand-point would supply much valuable information, and might open up new methods of dealing with our criminals.

HYPNOTIC SUGGESTION AS A THERAPEUTIC AGENT.

HON. J. M. CREED, M.R.C.S., L.R.C.P.

It is no longer necessary, as it was when I first advocated the value of hypnotic suggestion in the treatment of disease, to convince my audience of the reality of the phenomena.

Then I was often met with the assertion that it would only be possible to produce the effect in women or in feeble-minded persons. My opinion, formed very early in my hypnotic experience, has been confirmed, that, so far from people of small intellect being the better subjects, the higher the intellectual power the greater the susceptibility to hypnosis, provided the persons treated make their minds passive and, as far as practicable, temporarily thoughtless.

The better intellects are able to so govern their thoughts as to render their minds a comparative blank, and therefore the more suited to receive suggestions made by the hypnotist. The earlier of these will naturally be the condition of sleep with, if attainable, oblivion to all surroundings except the directions of the operator. With the inferior mind this desirable condition is not so easily procured, for the subject cannot curb his curiosity, but is continually wondering as to what is happening, or likely to happen. He asks himself, perhaps almost unconsciously, Am I going off? What does the influence feel like? Is he succeeding? &c., &c. So that unless success is achieved suddenly, almost by a kind of shock, prolonged monotonous suggestion becomes necessary, and even this does not always succeed.

It is a very general but quite mistaken idea that very intense influence is requisite for curative success.

Though, no doubt, deep hypnosis increases the receptivity of the patient, and is therefore desirable, success is very frequently achieved when there is no apparent change in the psychic condition of the subject. I have very generally been able to bring about the change in my patient's morbid state, which was my object when there has been no loss of consciousness, no cessation of muscular power, and even but little, if any, drowsiness.

It is very desirable to insure confidence, and therefore it is a great mistake to make rash promises which it may be impossible to fulfil. I say that "I can make no promises"; but that I will use the means to remove the objectionable symptoms which I had found to succeed in similar cases, and that I have every hope of good results in that under consideration.

Hypnotic suggestion to many minds implies an infallible remedy; but like other therapeutic agents, the hoped for results do not always follow. Many cases, however, which refuse to yield to the action of drugs or other commonly used means, recover with a rapidity which is surprising when suggestions are systematically made.

It must not be expected that physical changes will immediately take place; but the effect of the mind over the body is so marvellous that more favorable conditions are set up, in which much greater probability of good results may be expected.

Much of the success of many eminent practitioners is consequent upon the personal confidence they inspire; and though the remedies they prescribe may be the same, or almost the same, as those previously used by another doctor, the result is successful recovery, after previous apparently hopeless failure.

As a matter of course, it is in functional diseases that suggestion is exceptionally potent, and patients whose cases are practically hopeless under ordinary treatment make rapid recovery.

Christian Science is in every instance but auto-suggestion, made more effective by religious enthusiasm. No reasoning person can deny the

authenticity of many of the recoveries under its use which are claimed by its advocates. I submit, however, that suggestion by another person is more potent than when it is only the mental exertion of the subject needing aid. It requires a greater effort on the part of a sufferer to assert to himself that he is not suffering pain, or that disease does not exist, than to passively receive the suggestions made by another.

In addition, it is a curative agent only in the case of those having great religious fervour, though possibly not of the ordinary type. In conversation with ardent believers in Christian Science I have found that although all were confident that recovery occurs through the "Spirit of God," yet they have varying ideas as to the nature of the Deity; some insisting on Personality, others being "Pantheists," and believing not in a Personality, but in an all-pervading Power, the origin and cause of everything.

Such conditions of success must exclude a large proportion of human beings, whilst ordinary hypnotic suggestion meets the case of everybody who is susceptible and receptive.

Many persons when hypnotism is demonstrated to them, exclaim, "If I am ever ill or injured, I will try it!" Such an attitude is a mistake, for though in most cases of existing illness a good result follows suggestion, in accidents the shock is so great, and the desire of relief so ardent, that a passive mind is impossible, and immediate success, therefore, unlikely. To a person who had been previously successfully hypnotized, relief can be instantaneously afforded by the suggestion that all pain or spasm will cease. This in itself will be a great aid to recovery.

The general utility of hypnotism is materially lessened by the prejudices of many in regard to it. A very general idea exists that a person who has been hypnotized remains ever after under the direct influence of the operator; and that the subject will be unable to resist suggestions made by him, even of a malevolent or criminal character. In my experience this is not so, and the same opinion is generally held by other authorities. I do not think that a subject, however susceptible to benevolent suggestions, will commit under like influence any act which he conscientiously believes to be wrong, or which in his waking condition is repugnant to him. I have found that a patient in whom the mere wave of my hand and the command to sleep would produce a completely anæsthetic condition when consenting, will not be susceptible in the slightest degree when resisting. An additional safeguard exists in the fact that the operator, if desired to do so by the patient, can remove the power from himself, and transfer it to any other selected person, or even to the subject himself, with the faculty of giving authority to any one he may choose to influence him as occasion arises.

The power can be given to a good subject to produce hypnotic sleep by his own volition, on making use of an arranged signal, such sleep lasting for any period upon which he decides prior to his going off. Suggestions made by himself before falling asleep will also be acted upon at the time he fixes.

I have formed the opinion that success in hypnotic suggestion depends less upon the operator than upon the mental attitude of the subject. That the effect may be produced by any one on a consenting person, and that there is no emanation from the hypnotist affecting the patient. It is, however, unquestionable that some persons can much more rapidly and effectively influence a subject than others: but this, I submit, arises from

the possession of a personal bearing which inspires confidence, and impresses the person desiring to be hypnotized with the potentiality of the operator.

It is a matter for surprise that the use of hypnotic suggestion has come so little into general practice, in view of the convincing evidence of its utility made public by James Braid, of Manchester, in 1843, and by James Esdaile, of Calcutta, in 1846. A probable explanation is that the advocacy by Morton in 1846 of ether, and in 1847 of chloroform by Simpson, diverted attention from the utility of hypnotism in producing insensibility to pain in surgical operations.

Success in this direction would naturally attract the most attention, and on hypnosis being superseded by inhalation—the beneficial effect of which in no way depends upon the patient's mental attitude, but is promptly available at any time—the former became neglected, and little used, and was, therefore, never generally adopted. Its use in surgery is naturally the most impressive, and its disuse in this direction was followed by the cessation of its employment in the cure of disease.

Much evidence is obtainable—though moderns have even yet comparatively little exact knowledge of the effective causes of hypnotic influence—that older races made much use of it, and very possibly were able to give accurate explanations of the psychic phenomena produced. This, I think, may still be true of many of the greater minds among Eastern peoples.

It is now fitting that I should state some of the purposes for which I myself have used hypnotic suggestion with marked success.

ANÆSTHESIA.

In a hypnotic subject there is no form of anæsthesia which can be made so useful. All the good results of chloroform or ether can be obtained without any of the subsequent ill effects which often accompany their use. The system remains entirely free from contamination, and the recovery from insensibility is, if desired, immediate and complete, but, when needful, restful sleep can be prolonged indefinitely. Wakefulness is not necessary for the taking of food or for the exercise of any natural function, if suitable suggestions are made as required. Subsequent dressings, however frequent, can be performed painlessly.

Drs. Brady and Foreman, in Sydney, have operated entirely without pain on patients whom I had hypnotized. In a case in which Dr. Brady repeatedly operated, I was prevented on the first occasion from accompanying the patient, but merely sent him with a note telling the former the reason of my absence, and that I had suggested to the subject that he would become hypnotically anæsthetic at his command, and would obey his instructions as given. Everything happened as was wished, and a success was obtained, which the operator stated in a paper read before the New South Wales branch of the B.M.A. would not have been possible under any ordinary anæsthetic, either general or local.

Several dentists also have carried out extremely painful operations without the slightest inconvenience to their patients when the latter had been hypnotized by me.

Remarkable evidences of the marvellous alteration in nerve function brought about by hypnotic suggestion are the frequent instances in which I have enabled a good subject—generally of the highest intellectual power—on making use of an arranged signal, to entirely suspend the power of feeling pain, whilst still retaining complete consciousness and every other faculty.

This phenomenon was exhibited at a meeting of the New South Wales branch of the B.M.A. on 23rd December, 1898, by two of my patients whilst I had retired from the room. The condition of conscious anæsthesia was produced by the use of the signal I had given them a considerable time previously.

The marvellous endurance of apparently severe torture, voluntarily submitted to by Hindoo Fakirs or Moorish Marabouts, is probably rendered possible by some similar proceeding, either self-created or bestowed by another individual who has at some prior time established hypnotic control over and at the request of the devotee.

The power to suspend consciousness of pain may be of the utmost utility in the treatment of disease not necessitating surgical interference.

Cases in point are those of a gentleman of high scientific attainments who consulted me when suffering from a severe attack of pleurisy accompanied by very high temperature and excessive pain on every inspiration. As he was a good hypnotic subject I suggested that the pain should cease. This happened immediately, and he suffered no more during his illness.

Again, a patient suffering from very distressing dysuria, in which micturition was frequent and exceedingly painful, got immediate and permanent relief on suggestion.

A child of six, whom I had previously hypnotized, playing in a garden whilst I was present, fell and struck her head on the stone kerbing; I picked her up, and before she could cry out produced hypnosis by command, and the passage of my hand over the eyes. I then suggested she would feel no pain, nor have any recollection of her fall. I awoke her, and though a large swollen bruise was apparent, she continued her play as if nothing had happened, without any consciousness of pain.

GASTRIC ULCER.

I have frequently asked fellow practitioners what they thought would be the least likely malady to be benefited by hypnotic suggestion, and in almost every instance, either spontaneously or on suggestion (not hypnotic) the reply was "Gastric Ulcer." I differ entirely from this generally expressed opinion, for in numerous cases I have achieved from its use such results in a few weeks as are unobtainable by the treatment generally adopted in a very much greater number of months.

The reasoning on which I arrived at my decision to adopt this treatment was that when gastric ulcer is present the stomach lesion is generally confined to the limited area from which the mucous membrane has been abraded, and that danger to life depends on its depth as creating liability to hæmorrhage or perforation. The remainder of the mucous surface is capable of carrying on its function efficiently, but food is refused on account of the pain its passage over the wound produces. A condition of starvation is thus set up, which renders nutrition, absolutely requisite for the repair of any chronic ulcer wherever situated, unlikely, if not impossible. My object, therefore, has been to enable the patient to take adequate food without pain. This I have been able to accomplish in several good hypnotic subjects by suggesting that no pain would, as of old, follow ingestion.

I have formed the opinion that there is no greater danger of hæmorrhage or perforation from taking solid food in quantity according to appetite than in confining the diet to a few spoonfuls of predigested alimentary preparations. Whether the quantity is large or small the churning action of

the stomach must be much the same, and whether the abraded places rub against the opposite mucous surface of the stomach or over an adequate supply of food makes but little, if any, difference. I think that a well-filled stomach is in less danger than a nearly empty one. In this I am supported by my experience in the cases I have treated. In two of these considerable and repeated hæmorrhage had occurred, but both recovered in less than six weeks without a bad symptom, having increased in weight and regained normal strength.

Recovery under the treatment generally used is so delayed and uncertain that I feel it is not unfitting that I should press the adoption in cases of gastric ulcer of hypnotic suggestion for the relief of pain consequent on the ingestion of food, so as to render possible the administration of sufficient aliment to insure adequate nutrition, and consequent reparative action in the morbid places.

VOMITING.

Cases in which the stomach has for a considerable time rejected everything, in which all medicines or other applications had proved impotent, and in which death was imminent, have yielded quickly to hypnotic suggestion. Recovery has often been rapidly secured.

SEA SICKNESS.

Individuals who had always been very bad sailors have been enabled to travel on ship-board under adverse conditions without being distressed by sea sickness after its absence had been suggested under hypnosis prior to embarking.

INTESTINAL ACTION.

Intestinal action may be powerfully influenced by suggestion. Threatened diarrhœa has been avoided, and action of the intestines set up by its means in cases where the use of sedatives or strong purgatives had proved very ineffective.

NOCTURNAL INCONTINENCE.

This most distressing ailment of children, so very obstinate under ordinary treatment, quickly ceases under suggestion. Young children of three years old are quite susceptible to it with the best results.

MIGRAINE.

Migraine yields to suggestion very quickly, and headaches which have been persistent for many years cease to recur after hypnosis has been secured and fitting suggestions made. It has none of the dangers which accompany the use of the ordinary "headache cures," and is more consistently effective.

CHOREA.

This extremely obstinate disease has, after a persistence of years, been completely and permanently cured by me by means of suggestion in a few days.

EPILEPSY.

My personal experience of the influence of hypnotism in this dread malady has been confined to two cases, though I have had others reported to me in which benefit followed its use. In the first case, occurring in a gentleman thirty-eight years of age, it had had a duration of twenty

years. The highest authorities in both Australia, Great Britain, and the Continent of Europe had been consulted. Every effort made to ascertain the probable cause had been a failure. Even trephining under old scars had been twice performed without benefit.

The patient from the long and fruitless course of treatment had become imbued with the idea that recovery was hopeless, and this impression, I believe, had a potent mal-influence on his nervous system. I, however, gained such power that if a seizure occurred in my presence I was able to at once put him into the hypnotic state when, at my command, the convulsion would cease, and he would remain calmly asleep until I awoke him. When a fit took place without the controlling power of hypnosis being available he always had strange ideas which he was aware were delusions, but which he was unable to overcome. None of this took place when the attack had been aborted hypnotically. Though he did not get quite well he unquestionably received considerable benefit from the treatment. Before it he always required to be accompanied by an attendant whose service he was subsequently able to dispense with.

The second case was that of a nurse who frequently had seizures which deprived her of speech for an hour or more, and left her in a dazed condition, weak, and quite unable to carry on her occupation. She was sleepless, feeble, and had frequent vomiting, being able to take but little food. Under hypnotic suggestion she made marked improvement; could eat, sleep, and work without difficulty. The attacks became less frequent, latterly coming on only at long intervals. Renewed suggestion always benefited her, and removed the symptoms which without it always persisted to her disablement for duty.

I do not venture to speak of hypnotic suggestion as a cure for epilepsy, but I do dare to suggest that in a disease which is universally deemed to be practically incurable it offers a chance of amelioration which makes it a subject for regret that more sufferers from the malady do not apply for treatment by it.

Nothing can be more convincing of the potency of suggestion than the fact that I have been able to control an epileptic, and to stop the fit after it had commenced.

ASTHMA.

This most distressing complaint, which is so intractable under all ordinary treatment, is especially susceptible to the curative effect of hypnotic suggestion. I have repeatedly cured, so far as the disease can be cured, asthmatic victims by its influence. Many patients had been years trying all other remedies with but little success; very temporary relief having been afforded, whilst very considerable difficulty of breathing nearly always persisted.

I submit that any means by which an attack of asthma, even if it is not permanently cured, can be promptly ended, and the terrible dyspnoea removed, will be welcome to many chronic sufferers.

Suggestion after hypnosis will do this in every case in which sleep is produced, and in many others even when the influence obtained is not so great.

To find a patient, if a good hypnotic subject, cyanotic from spasmodic asthma, and be able by the passage of the hand before the eyes, and the utterance of a few words, to abolish all distress, and give unimpeded entrance of air to the lungs, appears a miracle to the sufferer, and must be the source of intense gratification to the practitioner who has performed it. I have been very successful in doing all this by the aid of hypnosis.

No victim to asthma of however long standing need despair of relief in a very short time if he has been previously hypnotized, and suitable suggestions are made as required. A patient once under control need not necessarily be treated by the original practitioner, who can transfer his power to any person desired, or may influence his patient by a letter or telegram, with the effect that perfect relief is almost instantaneously afforded.

INEBRIETY.

The great efficacy of hypnotism in the treatment of inebriety is unquestionable, but it is most difficult to publish evidence of the successes obtained. The most noteworthy cases are often those of men and women of social or business standing that renders it impossible to make definite statements, as they might disclose the identity of the individual referred to. Numerous persons of both sexes who have lost self-control with regard to alcohol have been restored on my action to health and sobriety by means of hypnotic influence.

An alcoholic subject who comes voluntarily for hypnotic treatment, and whose pecuniary position is such that he is not likely to be harassed by business worries in the near future after restoration can be confident that he will have all craving for drink removed, and be able to sleep and eat well. He will have no return of the craving for liquor, unless on the persuasion of injudicious friends or from a spirit of false confidence he commences to take alcohol again in small quantities. A restored alcoholic cannot safely venture to again take drink of any kind, for though he may at first produce no craving which is not controllable he runs dangerous risk of re-establishing his old trouble.

In some cases the influence obtained is so great for weeks or months that the attempt to put drink near the mouth, or even its smell, will produce nausea, perhaps vomiting. Such subjects are manifestly well protected.

As evidence of the potentiality of hypnotism on a man of intellect, an inebriate, I will quote a patient's own words, describing its effect on himself:—

“ For twenty-five years I have habitually taken alcohol in excess, and during the last fifteen in such quantities as to have been extremely detrimental to my health, both mental and physical. My calling is one which requires me to exercise much thought to carry it on with success, and as a consequence of my indulgence in spirits I have during this period felt myself getting gradually less capable of satisfactorily doing my work. In fact, I have been only able to do so by the repeated help of alcohol taken frequently during my hours of labour, in addition to excessive quantities after they had ended. This craving for stimulants I have found to be irresistible, and though fully conscious that I was blighting my social and professional prospects, which have been very bright, I could not permanently refrain. It is true that during the latter years I have on three occasions absolutely abstained from drinking for a few months at a time, but I did so with the greatest difficulty, and had to keep a constant watch upon myself to control my intense longing for stimulants, to which I was only kept from yielding by influences which exercised the greatest command over me. On each of these occasions I suffered what I can only describe as ‘torture’ when refraining, which made me irritable in the highest degree, and incapable of sustained mental effort. I could not sleep, was nervous in the extreme, and my general health was but little, if any, better than when I was drinking, while in spite of all my efforts I on each occasion relapsed into my old habit.

"This went on until 4th April of this year, on which date I did my last work prior to my recovery. On this day I consulted Dr. J., who, after due consideration, strongly pressed me to submit to treatment by hypnosis. This, though at first reluctant, I consented to do, and accordingly on 18th May I accompanied Dr. J. to Dr. Creed's residence. On this day I could only with much assistance get into or out of the cab, and could only walk with the support of his arm and a stick from the vehicle to the house, being unable to do more than drag my feet, hardly lifting them from the ground. I had, as always, slept but little the night before, and was nervous and apprehensive to an extreme degree, as I had been drinking freely to that moment.

"After hypnosis I returned home, feeling calmer and less nervous, and I slept well the whole of the next night. I submitted to hypnosis daily until the 24th, when I was prevented by having to attend a public function at which I walked a considerable distance without assistance. Since my first hypnosis I have lost desire for liquor, and have refrained from taking it without difficulty. I have slept soundly, have ceased to be nervous, and have felt wonderfully well, both mentally and physically. On the 25th, 26th, and 27th I was again hypnotized, and subsequently have undergone the same treatment at intervals of two or three days to the present time.

"On 25th May I commenced work of the highest importance, which I carried out to my own satisfaction as well as to that of the high authorities by whom I was employed. I have been able to fulfil my engagements with as much ease, and to as good effect as in my best days, and my capability for and satisfaction in classical studies have thoroughly returned, the reading of Aristotle and Plato in the original affording me my old mental gratification.

"On the third day, though I had no desire for it, apparently as a matter of habit, I poured out a glass of whisky, but on putting it to my mouth I found it had become so nauseous to me that I set it down untasted; and since this time I not only have taken no liquor, but have not had the slightest desire for it, the feeling of depression and craving, which was never absent during my former transient periods of abstinence having entirely left me, so that I do not find it necessary to exercise any will-power to refrain. I have slept very well every night; in fact, until impressed to rise at 7.30 a.m. I frequently overslept myself. I am now free from nervousness, am mentally strong, and capable of sustained intellectual work, and have ceased to be irritable. My physical health is good, I eat and digest well, and have recovered power in my legs, so much so that I can walk two miles quickly and without effort.

"Another circumstance worthy of remark is that I have been in the habit of smoking to excess. This, under hypnotic suggestion, has ceased, and I do not care for more than, say, two smokes a day, which I thoroughly enjoy, any beyond these having become extremely distasteful."

The remarks of this gentleman, that not only was his craving for alcohol removed, but that his habitual excess in smoking was reduced to moderation by suggestion, are worthy of notice.

When treating him I found that he was being injured by the amount of tobacco consumed, and so without warning him, when awake, of my intention, I impressed him that he would cease to enjoy more than two smokes a day, and that an excess of these would be repugnant to him. On the day following he expressed his astonishment that he had ceased to enjoy his hitherto constant habit, and wondered as to the cause.

I have produced similar remarkable results in other cases of excessive smoking.

INSOMNIA.

A good hypnotic subject can always produce sleep of the most restful character by suggestion. Dreaming generally ceases at night, after command during the day. The power to produce sleep at will, in the absence of the hypnotist, by the use of an arranged signal, can be given to the patient in most instances. Ordinary narcotics—always more or less deleterious—can thus be avoided, and more recuperative rest obtained.

It is difficult to recall a disease in which hypnotic suggestion may not prove useful, either in substitution of or in combination with the usual drug remedies.

For instance, in the treatment of dysmenorrhea relief from excruciating pain has followed my suggestion, when the usual sedatives proved impotent. Not only has it been effective at the period when cessation of pain was first needed, but the suggestion that future menstruation should be painless has been effective. In one instance I can recall, the lady—the mother of several children—informed me that from the very first appearance of the menses she had always had the most distressing pain at every recurrence, until at her request I suggested its absence. She lately told me that since that date she has invariably been unconscious of their appearance until she discovered the signs upon her underclothing.

I have removed suicidal impulses in several cases by suggestion in a few days. The morbid ideas going, and healthy mental thoughts taking their place.

Stuttering has been cured, and unhesitating utterance quickly established.

Appetite can be created in cases where ordinary tonics have failed to set up any desire for food.

Useful power has been restored in hemiplegia, consequent on a cerebral clot, when the pressure had been removed by absorption, but the brain functions destroyed still remained dormant; the hypnotic power apparently acting as a stimulant to the quiescent brain region which had been subjected to pressure.

Neuralgia and other painful nerve affections have been promptly cured. It is probable that the persistent sensation of an amputated limb, often very distressing to the patient, could be removed by suggestion.

I have found that cardiac disturbances, malarial fevers, and other general diseases of a character which would seem unlikely to be relieved by hypnosis, progress much more favorably with the assistance of suggestion than they had previously done under the same drug administration without it.

Many cases of sexual impotence are consequent less on physical defects than on nervous deficiency. Frequently the sole cause is the mental apprehension of failure. In such cases I have proved hypnotic suggestion to be a prompt remedy, potency being established very quickly.

Another point which is worthy of unbiased consideration by medical practitioners is an effect that I have observed to follow the use of hypnotism in feeble, nervous children. Many who are weakly and nervous grow strong and confident after being subjected to it for some other reason.

I am of opinion that nearly all practitioners can make use of hypnotic suggestion in their practice as an aid to other treatment.

Should a doctor not care to act himself he might with advantage get similar assistance to that he calls in for massage, electricity, or the X-rays.

I think it will perhaps be well if I point out the prudence—in a case in which pain or other distressing symptoms have been removed by hypnotic suggestion—of the medical practitioner carefully examining his patient to ascertain the pathological condition which gave rise to them, with the view of applying the necessary treatment to restore the parts to health.

THE TREATMENT OF ACUTE AND CHRONIC ALCOHOLISM AND THE CONTROL OF INEBRIATES.

Hon. J. M. CREED, M.R.C.S., L.R.C.P.

When treating acute alcoholism, my first step, during more than thirty years of practice, has been to at once forbid my patient taking liquor in any form, on the ground that the disturbance of the nervous system and the delirium, if present, is consequent on the saturation of the nerve centres with alcohol.

It has been advanced that delirium tremens is not the result of the directly poisonous effect of alcohol, but of a toxic substance which is generated by it, and that alcohol—which is thought to create this substance—is really an antidote. This view was set forth by Professor Jauregg, in a Paper read before the International Medical Congress at Vienna, in 1901.

My experience forbids my accepting this theory.

I find that the most potent factor, in the prompt recovery of cases of delirium tremens, is the absolute cessation of alcohol at the commencement of the treatment. In my opinion, its elimination from the system, by the action of the excretory organs, is essential, and, that until this is accomplished, the morbid symptoms are not removed. It, therefore, follows that every drop of liquor swallowed prolongs the time necessary for elimination, and consequently delays recovery.

I have never, in even a single instance, found such sudden and complete cessation give rise to any bad effects; but I am confident that the “tapering off,” very generally thought necessary, is not only not beneficial, but absolutely hurtful.

I consider it essential to, as far as possible, relieve the heart from any avoidable strain, and, therefore, insist on the patient being confined to bed, and keeping the horizontal position for, at least, three days. If he is allowed to sit up or wander about the room, the task thrown upon the heart—even if only from the hydrostatic pressure—is considerably greater than when the blood-flow is through the same channels rendered horizontal. Normal cerebral circulation is, therefore, the more quickly re-established.

I find that during the first few hours really hot milk is not only the best food, but an active stimulant, and I give as much as the subject will take. In addition, yolks of egg, beaten up in boiling water, with sugar and spices, if liked, and also broth, &c. As soon as the stomach can bear them, raw eggs, oysters, fish, poultry, chops, steak, &c., in as great quantity as can be enjoyed. Alcoholic stimulation having been prevented, the best nutrition is essential.

I never give a narcotic in a sufficiently large dose to render immediate sleep probable, but administer small doses of fitting sedatives at short

intervals. I consider that a powerful narcotic is frequently ineffective in procuring sleep, and is often a danger to life which it is imprudent to risk.

A purgative dose of calomel is necessary at the commencement of treatment, unless considerable diarrhœa is present.

My prescription in acute alcoholism has always been as follows:—

| | | |
|-----------------|---|---------------|
| R Sodii Bromid: | } | a.a. grs. 7½. |
| Ammon: Bromid: | | |
| Ammon: Carb: | | |
| Chloral Hydrat, | | grs. 5. |
| Tr. Nux Vom: | } | a.a. m. 5. |
| Tr. Strophantis | | |
| Tr. Digital: | | |
| Aq. ad. | | ℥ i. |

To be given every second hour.

The effect almost invariably is, that after less than six doses have been taken, sleep ensues and continues unbroken for some hours. It may be advisable, after four or six, to awaken the patient to give food and medicine, after which he will go to sleep again.

When sleep has once been secured, most subjects will continue somnolent for twenty-four hours, or even longer, and will then be free from delirium or delusion, having no craving for liquor, though eager for food.

So invariably is this the case, that I feel justified in promising that if my directions are followed, there will be no discomfort certainly in forty-eight, and probably in twenty-four hours, after the treatment is commenced.

In cases of an especially severe character, I sometimes give the first few doses of the mixture at intervals of only an hour.

I am emphatic in my condemnation of the administration of hypodermic injections of morphia to such patients, as many cases of death have come to my knowledge, following, if not being consequent, on its use.

After thirty-six, or perhaps, forty-eight hours, I alternate the doses of the first mixture with those of another, viz.:—

| | | |
|-------------------|-----|----------|
| R Ammon: Carb: | ... | grs. 5 |
| Liq: Cinchona | ... | m 10 |
| Tr. Nux Vom: | | |
| Tr. Strophantis | | |
| Tr. Digital: a.a. | ... | m. 5 |
| Aquam | ... | ad. ℥ i. |

So that the patient still continues to have non-alcoholic stimulants and heart tonics every two hours.

After convalescence has so far advanced as to render these medicines unnecessary, I give Parke, Davies & Co.'s Fluid Extract of Damiana in doses of 3℥ to 3i. every three or four hours.

I have formed the opinion, founded on my experience, that this drug is the best nerve restorative we have, and that its supposed power, as an aphrodisiac is only consequent, in the few cases in which it has such an effect, upon its influence on the nervous system generally. It is especially effective in cases recovering from acute alcoholism. Hypnotic suggestion may be added.

CHRONIC ALCOHOLISM.

In cases in which the persistence of the drink habit has been so marked as to justify the classing of the patient under this heading, it is advisable that every good influence should be made use of to induce him to refrain from taking any drink for the future.

Immediately after recovery from acute alcoholism is, therefore, an especially opportune time to press upon the subject the necessity which exists in his case, not to re-create the craving for drink which has been removed, by taking alcohol in any form for the future.

It is impossible to give instances, as the most successful cases are those in which men or women of good social or business standing, having recovered their lost self-control, would lose much or all they have gained by publicity.

A patient who has been treated for acute alcoholism will have no return of liquor craving until he again takes alcohol. One drink may bring about its return in all its intensity. This craving is a sensation of sinking, perhaps gnawing, located a little to the left of the epigastrium. It is relieved for a few minutes by a drink, but is worse than before in a very short time, when relief has again to be sought for by more liquor.

Repeated information, given to me by alcoholic subjects, enables me to state this with the utmost confidence.

The only effective prophylactic is, in my opinion, hypnotic suggestion, by which a healthy mental tone can often be restored.

A telling example can be given by the quotation of a statement made by a confirmed alcoholic subject of his own experience, the authenticity of which is beyond dispute.

He admitted that, though under strong religious influence, he had, from time to time, avoided taking drink, yet his doing so caused, what he described as "torture." Under hypnotic influence by me, however, he said that even on the first sitting he lost the craving, and was able to refrain from alcohol without effort; he went on to say, that, about the third day, apparently almost automatically—though he had no desire for it—he poured out some whisky, but found that he could not swallow it, from the intense nausea the attempt produced. I had suggested this effect.

I have been able to bring about this protection in many others, and it can be kept up indefinitely in good subjects, by suggestion repeated at moderate intervals.

I do not believe that a future effect can be brought about by the present administration of drugs, with the view of preventing a recurrence of the drink habit. Nor do I think, except so far as they restore nerve force and strength, are any of the so-called "drink cures" effective, unless by the suggestion which some subjects receive on taking them, that they are cured—will not have "liquor craving"—and so will be able to avoid taking alcohol without difficulty.

I am strongly of opinion that it is, at least, imprudent to make use of suggestion to reform drunkards, unless the aid is sought by the patient himself, and that he does not merely submit at the entreaty of friends, without being really, personally, anxious to be cured.

This desire is very generally present during the early period of recovery from a severe drinking bout, when all the suffering and misery is still a vivid remembrance.

The subject must be kept under observation for some time, his good health must be cultivated, and, as far as practicable, friction with the world mitigated.

This is moderately easy when well-to-do people are concerned, but is difficult, except under State protection, when the poor have to be dealt with.

When a man or woman has lost character for sobriety, it is extremely difficult to regain the confidence of employers, and there often arises so great a desire for oblivion from present troubles, that, though there may be no craving, the aid of drink is sought. This phase, however, can best be dealt with in the third section of my Paper, viz. :—

THE CONTROL OF INEBRIATES.

By the Act, which is now the law of New South Wales and Victoria, and, if not already, shortly will be, the law in South Australia, of which I was the originator, an inebriate is defined “as a person who habitually uses alcoholic liquors, or intoxicating, or narcotic drugs, to excess.”

By the first section, he can be placed, at the request of near relatives or other defined persons, in an institution for the treatment of inebriates, or under the care of a special attendant; or, by the third section, may be committed by a Court of Petty Sessions to a Government institution, after the third conviction for drunkenness during the preceding twelve months. By the eleventh section, any person who supplies “an inebriate, being the subject of an Order under the Act, with intoxicating liquor, or any drug or instrument which may be used for the purpose of producing a state of inebriation, is liable to a penalty not exceeding Ten pounds.” By this power it is rendered not difficult to prevent a drunkard obtaining liquor.

It will be observed that there is no legal necessity to prove that the person supplying the drink knew that the inebriate was a subject of the Act. Necessity to prove guilty knowledge would make conviction almost impossible. The absence of any minimum penalty will, however, prevent any grave injustice being done to any person who may, in ignorant good faith, supply the drunkard with drink.

By the sixth section, should it be found necessary, the Order of Committal may be varied, renewed, or rescinded by the Judge, Master in Lunacy, or Magistrate, who made it; or by the Supreme Court in its lunacy jurisdiction; or by a Judge thereof in chambers.

By the ninth section, any inebriate who escapes from an institution, or from the attendant under whom he has been placed, may be arrested and returned to his former custody.

The tenth section says:—“It shall also be the duty of all police officers or constables to assist the person under whose care an inebriate has been placed by an Order under this Act to compel the inebriate to comply with the direction of such Order.”

By section twelve, it is provided that no proceedings under the Act shall be published, except by the permission of the Judge or Magistrate adjudicating.

This was inserted to prevent annoyance being caused to the family or relatives of the inebriate by unauthorized and unnecessary publicity.

In section 1, power is also given, in cases where it may be advisable for medical treatment, to place a drunkard under control in his own house or that of a friend, or in a public or private hospital for twenty-eight days.

By the Act, authority is given to manage the estate of any inebriate, and to charge it with the cost of his treatment.

It will thus be seen that persons sufficiently related to an inebriate to be legitimately interested in his reform and well-being have ample power to do so if they choose to make use of the law.

The procedure I would recommend for the control of an inebriate would vary in accordance with his monetary position, and possible other circumstances.

For a person of means, I would suggest that a male should be placed under one or more attendants, one being put in charge, and the others being subordinate to him. A pleasant cottage, with suitable surroundings, in a pleasant country district, should be selected, in which the party should reside. It should not be in too close proximity to a place at which liquor could be obtained. There should be no strenuous objection to occasional excursions, with, perhaps, absence from home for a few nights, being made by the patient and his attendant, if the former desires it. Any lapse of duty on the part of the attendant in carelessly permitting his charge to obtain drink, can, under the regulations, be severely punished, and his removal ordered.

If it were thought preferable, the subject might be committed to a private licensed institution, when such places are established.

In the case of a female, the same course should be taken, with the substitution of trustworthy nurses or lady friends for the male attendants.

The first order should be for twelve months, and this should be renewed if doubt of the recovery of self-control by the subject renders it advisable in the interest of the patient.

In the case of a poor person, originally a worker, or who had so impoverished himself or herself as to be without means, it would be necessary to at once commit the inebriate to an institution, which, in the public interest, should be established by the Government of the State. This should be of an industrial character, affording means of employment that would repay the cost of the subject's maintenance.

Preferably, the occupation should entail work of a congenial character, principally in the open air. A farm settlement would be very suitable. Did locality make it possible, I would choose an island for the purpose, as having the security without the appearance or surroundings of a prison.

When it was found to be prudent at the termination of the first, or during the continuation of any further period of committal, I think the order should be so varied as to, though still keeping him under control, allow the inebriate to be at large, but under the supervision of some friend or other person, on whose adverse report he might be re-sent to the institution. During such probationary release, he would still be a subject of the Act, and any persons supplying him with liquor would render themselves liable to a heavy fine.

Though, when writing in the public press, I expressed the opinion that the suggestion I now make might well receive the attention of philanthropists, I submit it might be a remunerative erection by the Government.

A large building, on the lines of the Rowton Lodging Houses, might be established, in which there could be suites of two or more rooms for the accommodation of a probationary inebriate, his wife and family, or single rooms for a man or woman of that class. A common kitchen, or possibly a restaurant of economical character, would meet the food wants.

The probationary subject should be made a ward of the manager, who should have power given to him to direct the patient to go to his employment at the necessary time, and to return at a specified hour. Permission to leave the building for recreation, or other justifiable purposes, should be given by passes for specified periods. Obedience to the regulations could, when necessary, be enforced by the provisions of the ninth and tenth sections, as quoted above.

Men or women would not, in prudence, be transferred to such a probationary home until they obtained employment, either by their own action or that of sympathetic friends. Under these circumstances, there could be no better tenants than workers in employment, paying their rent weekly.

The rents to be charged, though kept strictly moderate, might be so fixed as to bring in at least 6 per cent. on the original outlay, which would provide interest on the capital value and a reserve fund for repairs and contingencies.

In this way a former inebriate might be, to a certain extent, protected against the worries and temptations of world life until, by experience, he had regained confidence, and realized that he can do his work and carry on without drink.

The knowledge that any lapse will render him liable to return to the industrial institution will be a powerful influence for good, and induce him to do all in his power to keep straight, and not to relapse from mere carelessness.

In saying what I have, I wish to clearly state that I refer to those who, if kept sober, are still able-bodied people, with a fair prospect of recovery if properly controlled.

The many decrepits, whose restoration is rendered hopeless by age or disease, should, in the public interest, be committed to a portion of the benevolent asylums to be proclaimed inebriate institutions for their reception, and should be kept there until they die, to the relief of themselves and their fellow citizens.

A few even of this class might, in time, perhaps, so regain bodily vigour, as to justify their being sent to the industrial institutions referred to before.

I would suggest that no attempt to treat any inebriate in an institution should be made until he asks for it himself, except such medical treatment as is found necessary to conserve his physical health.

Directly, however, he does make a request for the treatment of his psychic condition, every effort should be made to aid him. I, at the same time, desire to say, that beyond the improved health, the restoration of self-respect and self-control which will naturally follow absence from drink and congenial open-air occupation, I do not think there is any remedy so likely to bring about a permanent cure as hypnotic suggestion persisted in for a considerable time, and renewed at intervals subsequent to release.

If this is used, I am strongly of opinion that a much larger proportion of inebriates than is generally thought possible, will be permanently cured.

I base this opinion on my experience with patients successfully treated in my own practice.

AN INTRODUCTION TO THE RELATION OF THE FEMALE PELVIC ORGANS TO INSANITY.

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RELATION OF THE FEMALE PELVIC ORGANS TO INSANITY.

The idea seems so prevalent that there is some close relation between the female pelvic organs and insanity that I thought it would be interesting to try to get a clearer idea of how far this opinion is correct.

I have not found a great deal in the text-books on this subject, and what I did find showed me that the various observers had arrived at quite opposite conclusions, not only from the point of view of the frequency of pelvic disorders amongst the insane, but also as regards their treatment.

But where so little is known, and that little calls forth such diametrically opposite opinions, one may be sure there is an ample field for observation and research.

Just now, one may say that psychological medicine is passing through a transition period, and one has to re-adjust one's ideas in accordance with the toxic theories of to-day; it seems to me that much may be expected from more exact knowledge on this matter.

The toxic theory has impressed me very much, so much so that in making the clinical examination of a patient I have come to look for the toxic influence that initiated the mental symptoms, and to feel that I have missed the point, in the majority of cases, when I cannot find it.

Latterly, it has seemed to me that the pelvic organs were not without their influence in setting up a faulty metabolism, that is, a toxemia, and in that way giving rise to certain cases of insanity. When I entered the Lunacy Department, I was asked by Dr. Sinclair to pay special attention to cases where pelvic disease was associated with insanity. I was surprised to find that in comparatively few were there definite signs or symptoms suggesting pelvic lesions. Then I turned my attention to the dementia precox cases, where I now believe there are well-marked anatomical defects in the pelvic organs in the majority of cases; and this fact, in conjunction with the possible effect this might have on metabolism, has led me to the conclusion that the absence or excess of the ovarian secretion is a factor not to be disregarded in insanity.

This seems to me a point of considerable interest, yet I bring it before you with some diffidence, as there is so little yet in literature or scientific knowledge to support it.

RELATION OF THE FUNCTIONAL DISORDERS TO INSANITY.

The necessity of the regular functioning of the generative organs for the well-being and mental stability of the individual is established; irregularities produce well-marked mental disturbances, even in the normal being, and no one can observe the insane from that point of view without becoming profoundly impressed with the connexion between menstrual irregularities and insanity.

What the real nature of this inter-relation is is still a mystery. It may be that of a reflex interdependence between the generative organs and the brain. It may be of the nature of an auto-intoxication acting on the brain.

I believe the theory of the internal secretion produced by the ovaries is generally accepted—a secretion that is necessary to the health of the body and to the stability of the mind. It is supposed that these organs begin functioning at puberty, and cease at the mænopause—both of which epochs are associated with certain mental peculiarities amongst the sane, and give rise to the psychoses of these crises in unstable minds. So it seems that this establishment and decline in some way disturbs the internal economy for the time being, this disturbance being in those fine tissue changes known as metabolism, producing harmful waste matters, and known as an auto-intoxication.

Régis writes—"The tendency is to admit nowadays that adolescence, like all the great crises of the organism, manifests itself by nutritional

changes, and by auto-intoxications, and, as a result, the insanities of that period are due to an auto-intoxication."

MacPherson says—"That during menstruation there are well-marked changes in nutrition. It may possibly be that the secretion of the ovary—which, like the secretion of every other essential gland, is necessary to the health of the organism—may, when poured into the system in excessive quantities, disturb the function of the nervous system, just as hyperthyroidea acts. Countenance is given to this view by the changes that take place in the system during amenorrhœa, and at the menopause."

Whether disturbance of menstruation stands to insanity in the relation of cause and effect is still debatable ground. Irregularity, or a period of amenorrhœa or menorrhagia often precede insanity, and would suggest itself as a cause. But often the function is regular till the psychosis declares itself, becomes irregular or absent altogether during the acute stage, and returns during convalescence, or as the patient becomes demented; giving support to the view that the mental disturbance caused the cessation. Yet writers speak of the insanity of menstruation (Régis), of amenorrhœal insanity (Clouston), making it stand as the cause.

There is an undeniable connexion between the menopause and insanity, and the process of involution that is taking place in the pelvic organs would justify the assumption that there must be some alteration in the nature of the ovarian secretion to cause this—either a diminution or an excessive, but a periodic, output.

From investigations on the cases admitted to Callan Park Hospital during the past twelve months (1st September, 1907, to 31st August, 1908), in all, 167 cases, there were found to be 39 cases of purely functional irregularities. The disorders were amenorrhœa dysmenorrhœa, leucorrhœa, menorrhagia, and metrorrhagia.

I find these cases group themselves under five forms of insanity:—

Two epileptic insanity.

Four phthisical insanity (three dead).

Nine dementia præcox.

Fifteen climacteric cases.

Nine acute insanities (six acute mania; two acute melancholia; one organic dementia).

With the exception of the epileptic and phthisical cases, these are all classified by those accepting the toxic theory as toxic insanities, and I think it may fairly be claimed that defective metabolism, due to an absence or excess of ovarian secretion was the starting-point of the majority of these cases.

So it seems to me that the fundamental relation between the functional disorders of the reproductive organs and insanity is a toxemia.

Some of the French writers have reported good results from ovarian treatment in adolescent insanity, in the psychoses associated with menstrual disturbance in dementia præcox, menopause insanities, and insanity following on ovariectomy, or associated with minor or graver gynæcological conditions.

I think the subject is worthy of further investigation—to find whether some cases are not due to a diminution, viz., the stuporose and depressed cases, which might be expected to react to ovarian therapy and to separate these cases from those where the cause would be excessive secretion, where the mental state would be a phase of excitement. One would expect these to become more excited if treated by ovarian therapy—a condition which some French observers have noted.

I think the cases where one might anticipate the best results from ovariantherapy are early conditions of mental instability with menstrual irregularities in adolescence—that is, true adolescent insanity and hysteria. In these cases, the secretion of the gland could be supplemented till mental balance was restored, and the psychosis might be averted. I would also like to see a fair trial made with it in mænopause conditions where the mental symptoms were stupor and depression.

The scientific proof of this theory comes within the domain of biochemistry, but clinical observation would confirm the hypothesis, as the use of thyroid extract has done in the case of myxedema.

RELATION OF PATHOLOGICAL PELVIC LESIONS TO INSANITY.

The next question one naturally asks is, to what extent is disease, *i.e.*, pathological changes in the pelvic organs, a factor in insanity. Here again opinions are conflicting.

Some French observers, *viz.*, Piqué and his pupils, consider “that operative intervention amongst mental patients in curing their gynæcological complaints cured very often other mental states. Piqué found as much as 88 per cent. of gynæcological affections amongst the insane, and other observers have recorded still higher. He says the most frequent lesions are as follows, in descending order of frequency :—Metritis and endometritis, then malpositions and prolapse of the uterus, lesions and ulcerations of the cervix, ovarian and tubal complications, lacerations of the perinæum, and fistulæ, cancer, fibroma and polypus of the cervix. The highest success from the psychical point of view has resulted from operations on the ovaries and tubes than from disease of the body of the uterus and cervix. Therefore tumours of the uterus and torn perinæum are the least successful.

Other authorities consider that gynæcological complaints are not more frequent amongst the insane than with other women, and that in any case their operative treatment does not lead to a disappearance of the psychic manifestations. Régis says “that the symphonetic relation between melancholia (suicidal and homicidal, and uterine complaints is established, and has become one of the most interesting factors of psychiatry. This arises from the progress in gynæcology, which not only obliges the mental specialist to neglect less the state of the pelvic organs amongst the acute cases in their wards, but which tends to introduce more and more into these hospitals the gynæcologist, male and female.” Régis summarizes thus :—“And as regards the frequency of pelvic complaints in the insane, statistics seem to indicate that they are very common. So far, observations have been made in dissimilar lines, and it is impossible to draw definite conclusions.

“Concerning the frequency of pelvic lesions in the production of psychoses, and on other special forms, the relation is less evident, as it is not sufficient to prove the increased frequency in order to establish it as the cause of the mental trouble. A pelvic lesion may be considered less as the cause of the mental trouble than as influencing the type of trouble by acting as a starting point for other delusions and hallucinations.

“With regard to the curative influence of the gynæcological operation on other psychoses, one is on very debateable ground.

“The result put forward by certain observers (Brucke, &c.), *viz.*, 60 per cent., are beyond belief. Sixty per cent. of cures and ameliorations would establish gynæcological operations as the treatment *par excellence* for insanity. Whatever may be the true average of success, it does not follow that the disappearance of the mental symptoms after an operation

are entirely due to the operation itself, or even that there is the least relation between them. Those experienced in mental work know that any shock, traumatism, suppuration, or acute illness may bring about a cure, or an improvement. One might also cite numerous cases where the conditions were favorable (considering the relation that seemed to exist between the pelvic lesions and the nature of the delusions), and where operation caused no result. One must not forget also that with a great number of women gynæcological disorders cause no intellectual trouble, and with the insane the disease may be existent, and yet be unsuspected, till a chance examination reveals it. Further, those affected with serious pelvic lesions—big tumours, &c.—may be cured of other psychoses without operation.

It may be considered, therefore, that gynæcological investigations deserve to be followed up in mental work, but there, as elsewhere, surgery ought to be strictly confined within the limits of its operative indications."

To sum up:—

1. One may admit, whilst awaiting more definite research, that gynæcological diseases are comparatively common amongst the insane.
2. Amongst the first class of cases (the most numerous), it is a mere coincidence, and the lesion has had nothing to do with the production of the psychosis.
3. In the second class, the gynæcological condition acts solely by influencing the delusions, or giving rise to hallucinations.
4. In certain rare cases, the gynæcological condition may be considered as the determining cause of the mental state, either by its reflex action, or by the auto-intoxication accompanying the lesion. Such a case is manifestly the result of the local lesion, progresses equally with it, and assumes usually the form of agitated melancholia, or of mental confusion, with visceral delusions and hallucinations.
5. It is justifiable and desirable (with certain reservations) to make an examination of the pelvic organs amongst the insane as one would make it in other cases.

RELATION OF OPERATIONS ON PELVIC ORGANS AND INSANITY.

Concerning post-operational insanity, an English authority (Mac-Naughton Jones), writes:—"In operations on the female pelvic organs, there is greater predisposition to mental disturbance than after other operations. Also that women who have been insane are disposed to relapse if they develop diseases of the pelvic organs, and especially to recurrence of insanity after operations on these organs."

Spencer Wells recorded two cases of insanity after ovariectomy, and had seen patients almost melancholic after it. Keith mentions six cases of insanity after operation of ovariectomy, and Savage observed four cases. Lawson Tait said he had no cases of insanity following ovariectomy, and Bantock also saw none. Régis states:—"Certain authors have sought to establish a direct connexion between insanity and gynæcological operations as being the ones most likely to lead to insanity. In reality, the nature of the operation influences the mind much less than the intensity of the auto-intoxication caused by it. Often the slightest operations cause the gravest disturbance. Post-operational insanity comes on mainly in people threatened with auto-intoxication, such as the hepatic, the constipated, those with arterio-sclerosis, and old people, whose eliminating processes are decayed."

Following on the above remarks, I have been investigating the cases that have been admitted within the past twelve months (September 1st, 1907, to August 31st, 1908) to Callan Park, to find the percentage of gynæcological conditions that existed. I find that out of 167 admitted there were 28 cases, about 17 per cent., whose history or symptoms pointed to pelvic lesions as a possible cause, or whose condition justified examination, in the hopes of being able to influence the mental condition.

Classifying these according to Régis' method, and where the pelvic condition was a mere coincidence, of this type there were eight cases, and where the pelvic condition influenced the delusions, under this type were four cases; and where the pelvic condition might be considered the cause, there were only two cases. This only accounts for 14 of the 28 cases. The other fourteen I have divided accordingly:—

1. Where pelvic conditions were said to exist, and believed by friends or relatives to be the determining cause, yet which, on examination, did not exist, or else were malformations. Of such there were seven cases.
2. Post-operational (gynæcological) cases.—Of these there were also seven cases. With the exception of two general surgical cases, these were the only first operational cases admitted during the year, and it seems to support the theory that gynæcological operations do head the list in causing insanity after operations.

There were, of course, 140 other patients not examined with the possibilities of pelvic conditions. In some of these, the delusions were distinctly of a sexual nature, but as there were no signs or symptoms suggesting pelvic disease, no effort was made to investigate merely for the delusions.

DISCUSSION ON DR. KATE HOGG'S PAPER.

Dr. BEATTIE SMITH remarked that there was much value in the statement that ovarian secretion was necessary to health, and that the epochs of puberty and the climacteric showed this. The "periodic output" mentioned by Dr. Hogg was difficult of estimate, and depended, no doubt, on many causes and excitations. The paper gave cause for much reflection as to the propriety of systematic pre-examination, even though under an anæsthetic, and by a female medical officer. Certainly why the generative system should not be in ordinary course inquired into as well as the alimentary and circulating, was a matter not satisfactorily dealt with by the best British authorities, who appeared to approve only of such examinations where signs existed for operative interference, when the condition *per se* demanded it, and not merely with the view of a supposed cure of the mental state. Dr. Beattie Smith mentioned his experience of the unfortunate results of operations, particularly ovariectomy, and chiefly for the reason of the loss of the "periodic output," and in this connexion mentioned organotherapy favorably. The whole question bristles with importance, and one hopes that some British authorities would deal exhaustively with it. Dr. Kate Hogg's contribution to the subject, and its associate treatment in primary dementias was certainly instructive.

Dr. Fishbourne and Dr. Gamble also spoke.

RECENT INVESTIGATIONS INTO THE PATHOLOGY AND TREATMENT OF GENERAL PARALYSIS AND TABES DORSALIS.

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In response to the invitation of your honorary secretary to contribute a short paper to the proceedings of the section, I propose to state very briefly some of the main results of the observations that have been made during the past year in the course of the special investigation into the pathology and treatment of general paralysis and tabes dorsalis commenced by my colleagues and myself in 1902.

For the sake of those who are not familiar with the contents of the published papers, I shall preface what I have to say by a short summary of the observations and conclusions already recorded. We have found that bacilli of the diphtheroid group, possessing prominent meta chromatic granules, can be shown to be invading the tissues in all cases of advancing general paralysis and tabes dorsalis. The chief seats of invasion, or of the infective foci, are the naso-pharyngeal and oral mucosæ in cases of general paralysis, and the genito-urinary tract in cases of tabes. Evidence of such invasion has been obtained by the direct examination of scrapings from the surface of these mucous membranes. Confirmatory results have been yielded by bacteriological examination. Further evidence in support of the occurrence of such invasion has been obtained from the examination of the cerebro-spinal fluid removed by lumbar puncture. In the centrifuge deposit from this fluid, bacilli have been demonstrated in several instances, and in two cases the deposit has yielded a pure culture of a similar bacillus. Growths of diphtheroid bacilli have now been obtained from the brain, *post-mortem*, in numerous cases of general paralysis, and these micro-organisms have also been demonstrated in microscopical sections of the brain. It has been ascertained that two species of the diphtheroid bacilli isolated from cases of general paralysis, or of tabes dorsalis, are often virulent to mice and rats, whilst being innocuous to guinea pigs. The first of these species we have termed the *bacillus paralyticans longus*. It is characterized by certain morphological and cultural characters, and by the fact that it produces an acid reaction when grown in a glucose test broth, but not when grown in numerous other laboratory test broths employed in determining bio-chemical reactions. The second species (*bacillus paralyticans brevis*) is specially characterized by the fact that it produces an acid reaction in a saccharose test broth, as well as in the glucose broth; whilst it gives a negative result with numerous other test broths. Some of the rats that have succumbed to the action of the *bacillus paralyticans longus* have shown the cerebral changes characteristic of general paralysis, whilst several of those subjected to experiment with a strain of the *bacillus paralyticans brevis* suffered from acute nervous symptoms, and microscopical preparations show very marked morbid changes in their cortical and spinal nerve cells. Dr. McRae and I have further recorded the fact that we have found that treatment of cases of general paralysis and tabes dorsalis with an anti-bacterial serum, prepared in the sheep by immunization with these special diphtheroid bacilli, has been attended in many cases by distinct arrest of the symptoms indicative of active progression of the disease. Before using an anti-serum we obtained similar but less distinct results by treatment with vaccines composed of killed cultures of these bacilli.

In the course of the investigations carried out more recently, several new facts have been elucidated, and much evidence has been obtained confirmatory of contentions already advanced. In the clinical portion of these researches I have had the co-operation of Dr. Dods Brown.

It has been found that many strains of the *bacillus paralyticus longus*, when provided with ordinary aerobic cultural conditions, will not grow at all, or will grow only very feebly for two or three days, and then die out. If, however, semi-anærobic conditions are provided, by heating the upper end of the culture tube and dipping the cotton wool plug in melted hard paraffin before it is inserted, the bacilli will grow in minute but distinct colonies. That this bacillus is not essentially different from the vigorously growing types is evidenced by the facts that it has the same bio-chemical reactions, that in many instances it has a distinct degree of virulence to mice, and that in respect of the characters of growth there is a gradual series, extending from feeble to vigorous strains. In the large majority of instances the *bacillus paralyticus longus* is of the feebly growing type, and requires the provision of semi-anærobic conditions for its successful cultivation. I now always use a glucose agar medium and seal the tubes in the way just described. By the employment of these cultural methods and the examination of direct films, evidence has been obtained of the constant presence of these special bacilli in the nasal cavities in a fairly long series of cases of general paralysis. The study of sections of the nasal mucosa and subjacent tissues has shown that these bacilli are capable of invading along the lymphatic channels. They have now been traced along these channels, through the base of the skull, to the intra-cranial lymph channels and the brain. The tissues lying between the nasal epithelium and the base of the skull have been found to be loaded locally with plasma cells and disintegrating diphtheroid bacilli. A study of the pathological processes occurring in this region shows that the endothelial cells of the lymphatic channels are the chief defensive agents against the bacilli, and that there are areas in which this defensive mechanism appears to have become exhausted.

By the employment of special methods, more particularly the palladium methyl violet method, the platinum method, and the ammonio-silver process, with cyanide decolorization, it has been ascertained that the presence of diphtheroid bacilli in the brain of the general paralytic is much more common than we previously regarded it. In most instances the bacilli will not stain by the ordinary methods, either because they have suffered from lysogenic action, or because they are present only as involution forms which have little affinity for aniline dyes.

With regard to the treatment of general paralysis we have lately, I think, clearly established the fact that there is a great advantage in combining active immunization by means of injections of killed cultures with the passive immunization obtained from the administration of the special anti-serum. The two methods are in no way incompatible, and it may be suggested here that a similar association of active and passive immunization (already found to be of service in immunization against anthrax) might prove of value in several other bacterial infections. It would appear from results that we have obtained that the morbid process in general paralysis and *tabes dorsalis* can be arrested by these methods of treatment if it is not complicated by severe secondary infections. In the cases in which the treatment has not been successful, there has always been abundant evidence of such secondary infections.

We have endeavoured to combat the naso-pharyngeal and oral infections by local measures. In view of the evidence of the destructive action of oxygen upon certain strains of the special bacilli, it occurred to me that Merck's perhydrol would be worthy of trial in the form of a nasal spray. We have used this extensively in a 1 per cent. solution, both as a nasal spray and as a mouth wash (applied daily, or every other day), and there can be little doubt that distinct benefit has resulted in many cases. It is, perhaps, not out of place to mention here that I have found the daily spraying of the nasal mucosa with 1 per cent. perhydrol is a remedy of striking efficacy in three cases of hay fever. In this malady its action is probably in part mechanical, for it is not unreasonable to suppose that the minute bubbles of oxygen which form at the surface of the mucosa serve to remove the pollen and particles of dust which, lodging there, set up such intense local irritation.

Another fact regarding the pathology of general paralysis that our more recent observations have clearly established is that secondary bacterial affections are extremely prone to occur in the infective foci. The micro-organisms concerned appear to be especially streptococci, staphylococci, and certain species of diplococci. Evidence of mixed infection may be seen in the condition of the gums in most cases of general paralysis. *Pyorrhœa alveolaris*, which, of course, is not by any means confined to persons suffering from general paralysis, is almost constant in well established cases. Bacteriological examination of the contents of the spaces between the teeth and the gums and histological examination of the inflamed tissues show that numerous forms of micro-organisms, including diphtheroid bacilli, are actively invading. There is evidence that a similar multiple invasion occurs in many cases from the naso-pharyngeal mucosa. In advanced cases it extends much more widely throughout the respiratory and alimentary tracts. It is clear that in such cases we have to treat, not only the primary diphtheroid infection, but also these secondary infections. These we are now, in some special cases, endeavouring to combat by special vaccines and local measures.

My colleagues and I have always maintained that syphilis commonly plays an important part in the pathogenesis of general paralysis. We have merely contended that it does not act directly, but by impairing the local and general defences against certain bacteria. There is now strong evidence in support of the conclusion that, as a cause of general paralysis, syphilis acts mainly by damaging the nasal mucosa in such a way as to weaken its power of resistance to certain forms of bacterial attack.

Further bacteriological, histological, and experimental evidence has been obtained bearing out the opinion that *tabes dorsalis* is dependent upon an invasion from the genito-urinary tract by special diphtheroid bacilli. There is good reason to believe that, as a predisposing factor, gonorrhœa is of greater importance than syphilis. One part of the evidence in support of the conclusion that a diphtheroid invasion is the essential element in the pathogenesis of *tabes* consists in successful therapeutic experiments. The further course of the two cases which Dr. McRae and I have already recorded bears out the opinion we have formed that this disease, if not complicated by serious secondary infections, can be combated by serum and vaccine methods. Under such treatment the lightning pains, which in both cases were very severe, have virtually disappeared,

the progress of the disease has been arrested, and the general health of the patients has undergone a very striking improvement. Details of these further observations will be published in course. For the present I would merely add that the facts recently observed have served to establish more securely the conclusions that general paralysis and tabes dorsalis are dependent upon the presence of specific infective foci, primarily localized in the naso-pharyngeal and oral mucosæ, in the one case, and in the genito-urinary tract in the other, and that in both diseases the bacterial and toxic invasion is essentially lymphogenous, as maintained by Orr and Rows on the ground of their experimental work.

[NOTE.—Dr. Ford Robertson has not had opportunity for revising proof.—ED.]

DISCUSSION.

Dr. FLASHMAN (Sydney) said—I think we must all regard it as a very high compliment to this Section that Dr. Ford Robertson has found time to send us a paper and exhibits; and, on the other hand, we trust that Dr. Ford Robertson will look upon the request for a paper sent to him by our secretary as an acknowledgment on the part of this Section of the high esteem in which he is held as a neuropathologist. We are all of us familiar with the great work of Ford Robertson in regard to general paralysis and tabes. On viewing the preparations of diphtheroid organisms shown in the next room, one cannot but admire the mastering of technique shown by Dr. Robertson. In almost every subject that he takes up he seems able to evolve an especially suitable method for his purpose. The granules shown in some of these preparations are most striking. Some time ago, Dr. Eyre and myself made some investigations in regard to the presence of these organisms in the insane. For the purpose of that investigation we used blood-serum tubes, and I think that our results can be compared with the results obtained by other investigators who have dealt with these organisms. Some of my more recent experiences, however, with Robertson's byno-hæmoglobin agar have convinced me that, when searching for the presence of a diphtheroid organism in any material, one more often gets a positive result with this medium than with ordinary agar or blood serum. As to the view I now take in regard to the rôle of these organisms in tabes and general paralysis, that will be expressed in a paper Dr. Latham and I intend presenting to the Section later on, but I think I may here say that I feel that the subject of the frequency of the presence of diphtheroid organisms in the bodies of the insane should be again taken up, using especially Ford Robertson's own methods. Using the ordinary methods, Dr. Eyre and I obtained certain results, which I think were carefully and accurately arrived at, and which I still think can be relied on. On the grounds, however, that Ford Robertson still succeeds in finding the organism in a very large percentage of cases of general paralysis, and that I myself have occasionally been surprised to find a good growth on byno-hæmoglobin when there was none on blood serum, I intend to again investigate the matter. I again thank Dr. Robertson for his paper and exhibit.

THE PATHOLOGY OF GENERAL PARALYSIS OF THE INSANE,
WITH SPECIAL REFERENCE TO THE ACTION OF
DIPHThEROID ORGANISMS.

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As is well known, the pathology of insanity has, during the past five years, to a very large extent, centred round that of general paralysis. Not only have those pathologists whose work specially brings them into contact with mental and nervous diseases devoted their time to this branch of the subject, but at length the general pathologist has done what was inevitable, and has recognised general paralysis as being just as legitimate a subject for his investigation as is tuberculosis. During the last year or two considerable attention was paid to this subject in such a well-known general pathological research laboratory as that of the Infectious Diseases Bureau, in Berlin. In other places of general research the subject of melancholia has excited the interest of bacteriologists. This change of view in regard to mental diseases is very gratifying to those who realize that there is no specific difference between the pathology of so-called mental and so-called bodily diseases.

The time has arrived in which our pathological vision has become clear enough to enable us to see and acknowledge the essential unity of pathological processes. The pathology of the nervous system is subject to the same general laws as is that of the muscular, or any other system. Those aiming at special knowledge of one must, in order to acquire the capacity of forming a just and proper judgment in respect of it, be acquainted with the knowledge gained in regard to the others.

We think, therefore, that although many of our auditors may not be specially concerned with diseases of the nervous system, yet on general medical and pathological grounds the subject of general paralysis cannot fail to interest them.

This disease may be said to have been first recognised by Esquirol and his pupils about 1815, though isolated cases had previously been described. For many years it was looked upon as being the result of sexual and other excesses.

About 1870, Fournier pointed out the large number of cases which had suffered from preceding attacks of syphilis. His observations were extended and confirmed by others; and it has now come to be generally recognised that syphilis undoubtedly plays a very important part in the production of general paralysis and tabes dorsalis—two diseases which are regarded by all leading neurologists as being due to the same pathology of different neurones.

Erb's statistics¹ are most valuable in regard to the connexion between syphilis and tabes. They show that of 1,100 male tabetics of the better classes, 90 per cent. had had preceding syphilis; whereas of 10,000 male patients of the same class who consulted him for other diseases than tabes, only 21.5 per cent. had had preceding syphilis. As stated, these statistics refer to tabes. It is impossible to get reliable statistics in cases of general paralysis, because of the early onset of mental symptoms, including loss of memory. Ferrier,² however, believes—and he is by no means singular in this respect—that “essentially the same is true of general paralysis.”

To compare with the above figures, one must note that in cases showing definite tertiary lesions such as gummata, a history of the primary sore could be obtained in only 54 per cent. of the cases, and even in secondary skin lesions there was only a history of syphilis in 80 per cent. of the cases.

These facts have been sufficient to implant in the minds of most medical men the belief that syphilis will, one day, be definitely proved to be the cause of general paralysis. Fournier's views on this subject are of interest. He, in his "Treatment and Prophylaxis of Syphilis" (1906), states the generally accepted view thus:—"It is now generally accepted that certain affections, which frequently occur in syphilitic subjects, are the consequences of syphilis, without being syphilitic except in origin, and to these have been given the name 'parasymphilitic.' . . . The three principal types of parasymphilis are tabes, general paralysis, and buccal leucoplasia, with its common sequence, cancer of the tongue—all incurable affections, with an inexorable prognosis."

However, this belief is not shared by all. There are many who see insuperable objections to accepting syphilis as the cause of general paralysis. Their minds are impressed with the great fact that only a very small proportion of syphilitics become general paralytics; they further assert that cases are recorded in which a general paralytic has acquired syphilis after the onset of the general paralysis; that though it is regarded by the upholders of the syphilitic hypothesis as a post-tertiary manifestation, yet secondary eruptions are said at times to occur during the course of the disease; that general paralysis has often occurred in cases which were, in all human probability, free from syphilis.

The first objection is the most important, and means that there must be some other agent or special condition of the tissues which determines the nervous disease.

Mott has given some interesting evidence going to show that the syphilitic toxin varies greatly in virulence against the nervous system, and that it is only syphilis of a certain type which leads to tabes or general paralysis. It may be that this line of investigation may eventually lead to the removal of the difficulty as to why so few syphilitics are attacked in their nervous systems.

So far as we can ascertain, there does not appear to be much authentic evidence to prove that general paralytics contract syphilis. This implies that there exists a large amount of negative evidence to the contrary.

We are certainly not in a position to say that it is proved that syphilis is indispensable in the etiology of general paralysis.

It seems, then, that we are only able to make the following indefinite statements in regard to our present knowledge of the connexion between syphilis and general paralysis:—

1. Syphilis does not always pass on to general paralysis.
2. Syphilis may, under certain circumstances, produce general paralysis.
3. It has not been proved that syphilis is an indispensable factor in the production of general paralysis.

We believe that the available evidence proves no more than this.

That syphilis may not be indispensable is a belief held by many—and till recently it had to be admitted that such a belief had much to justify it.

How uncertain our present position is in regard to this question the following quotation⁴ will show:—

"In the estimation of many authorities, syphilis is regarded as the most common cause of general paresis. Bonnet and Anglade have held that in 70 to 90 cases out of 100 in general paresis, syphilis has existed. Bannister gives the percentage as 89, Houghberg 75.7, Mendel 75, Berkley 50, and Gra 40 per cent. According to Kraepelin the subjects of syphilis are from sixteen to seventeen times more liable to general paresis than others not so affected. The tendency of the age is to regard the cases of general paresis, where syphilis has existed, as a parasymphilitic disorder. The exact relationship between syphilis and general paresis has not been solved, although it has been under active discussion for a long time. Mickle quotes the statistics of Lewin, in which, out of 20,000 cases of syphilis, only 1 per cent. became insane, and not one case of general paresis developed. The pathological processes of syphilitic brain disease and general paresis are different. In syphilis there are changes in the blood vessels, and the formation of gummata, or diffuse meningeal infiltration. The first and third occur about the base of the brain, while the second is more apt to appear in the cortical region. On the other hand, in general paresis there is a chronic meningitis of the convexity, with atrophy of the cortex. Some years ago Peterson made a study of syphilis as an etiological factor of paresis, which comprised an examination of the contributions of no fewer than 70 authors, and his conclusions in this connexion are interesting—(1) A history of syphilis is found in 60 to 70 per cent. of cases of general paralysis of the insane; (2) the fact must not be lost sight of that in 30 to 40 per cent. of these cases no history of syphilis, congenital or acquired, is to be found; (3) antecedent syphilis is seven to ten times more frequent in general paralysis than in other forms of insanity; (4) syphilis is, therefore, to be looked upon as a frequent, but not constant, factor in its production; (5) but paralytic dementia is not a form of specific disease, not a late syphilitic manifestation, nor is it a form of degeneration depending upon the syphilitic poison for its origin; (6) the relationship of syphilis to general paresis lies in the facts that it is a widespread disorder in all communities, that it weakens the constitution and vitiates the blood in many in whom it infects, and that the system is thus prepared in many cases for the direct operation of the final etiological factors of general paresis, viz., alcoholism, excessive venery, heredity, and mental overstrain, and excitement."

Although we consider that the above quotation states the present generally accepted views, yet it must be admitted that these views may very shortly have to be modified should the recent work in Berlin be confirmed. The application by Wasserman and Neisser⁵ to syphilis of Bordet and Gengou's method of deviating the complement was followed by the investigation by Wasserman and Plaut⁶ of the presence of a syphilitic anti-body in the cerebro-spinal fluid of cases of general paralysis. Their investigations tended to show that practically all cases of general paralysis were of syphilitic origin. Plaut, in a more recent paper in the *Centralblatt für Neurologie*, states that he found evidence of previous syphilis in 94 per cent. of the cases of general paralysis investigated. These facts, if corroborated, would certainly go far to show that the aphorism—no syphilis no general paralysis—was correct. For the present the amount of work done with the serum diagnosis of syphilis in general paralysis is too small, and the results too uncorroborated, to permit us to base any conclusions upon them, and we therefore are compelled for the present to hold by our third assertion, viz., that it has not been proved that syphilis is an indispensable factor in the production of general paralysis. If, then, we can go no further than the three above statements permit, we must

conclude that syphilis only under special circumstances produces general paralysis, and may possibly be replaced by some other factor. It has been asserted, and is believed by many, that alcohol, plumbism, and various excesses may take the etiological place of syphilis; some even believe, on the grounds of their experience, that mental and moral shock may produce the disease in the absence of syphilis. Apart from all this, the fact that not all cases of syphilis go on to general paralysis, is conclusive evidence that syphilis requires an ally in the production of this mental disease. What is the nature of this ally?

As we have seen, many believe this ally to be excess of various kinds—others think that worry and mental overstrain may supply the missing factor. Naturally enough, bacteria of various kinds have been suspected as having something to do with the disease. The latest and most important pronouncement in this respect, and one in regard to which men's minds are now considerably exercised, is that of Ford Robertson and his co-workers.

In 1903 Ford Robertson, M'Rae, and Jeffrey made the following statements:—“(1) There is evidence that not only the alimentary canal, but also the respiratory tract is the seat of origin of a severe toxic infection in general paralysis. (2) That whilst the causal agents of this toxic infection from these regions are represented by various bacterial forms, there is one micro-organism which appears to have a special significance. . . . This organism is one that resembles the Klebs-Löffler bacillus.” From that date till the present, Ford Robertson, either in conjunction with his co-workers or alone, has published many papers giving the results of *post mortem* examinations of cases of general paralysis, as well as the results of clinico-pathological investigations on the living subject. These investigations make it appear that there is a very constant association between diphtheroid organisms and cases of general paralysis. In the year in which they made their original communication, Robertson, in conjunction with Shennan, published a preliminary note on the result of experimental investigations into the pathogenicity of this organism with regard to animals. In this preliminary note it was stated that, amongst other symptoms, the animals showed “marked inco-ordination of movement, dyspnœa, and great drowsiness,” and the histological evidence warranted them in concluding “that the associated changes in the central nervous system have a distinct resemblance to those which occur in dementia paralytica.” No fuller account of these investigations, though promised at the time, has, so far as we are aware, been published.

In this work, then, of these investigators, we see an attempt to settle, in a bacteriological manner, the question as to what other factor may be at work besides syphilis in the production of general paralysis. Robertson and his co-workers have been so impressed by the close association of general paralysis with this diphtheroid organism (*Bacillus paralyticans*) that they do not hesitate to assert their belief in it as a causal factor in general paralysis. Unfortunately, very few other investigators have, so far as we are aware, made investigations along similar lines. In 1905 Dr. Eyre,⁷ in conjunction with one of us, made an investigation into the occurrence of diphtheroid organisms in the throats of the insane. The conclusions arrived at were as follow:—

1. That the percentage incidence of all diphtheroid organisms in the throats of the insane (17.3 per cent.) is not in excess of that noted in the sane population (18.5 per cent.) outside the walls of an asylum.

2. That the percentage incidence of genuine *B. diphtheriæ* (5.07 per cent.) in the throats of the insane is smaller still (a large proportion of the diphtheroid organisms noted were common saprophytic members of the diphtheria group of bacilli), and compares well with 6.9 per cent. in the healthy sane.
3. That there is no evidence to show that *B. diphtheriæ* is more common in the throats of general paralytics (5 per cent.) than in the throats of cases of other forms of insanity (5.1 per cent.).
4. That the number of general paralytics examined *post mortem* is too small to enable any definite conclusions to be drawn therefrom. At the same time it is a significant fact that *B. diphtheriæ* was not isolated from any of these cases.
5. That the majority of the strains of *B. diphtheriæ* isolated from the throats of the insane are of low virulence and slight toxicity, and so compare in these respects with the types found occasionally in the throats of the healthy sane.
6. That having due regard to the above conclusions, we are unable to trace any casual connexion between *B. diphtheriæ* and general paralysis of the insane.

Soon after this paper appeared, Ford Robertson⁸ pointed out that he thought the evidence the writers had collected in regard to diphtheroid organisms scarcely affected the question, and expressed disappointment that they had not followed his special methods. The chief work done—as the title of the paper indicated—was upon the question of the relative frequency of these organisms in the throats of the insane. We felt at the time that if these diphtheroid bacilli were present in the body of the patient in large numbers, that the throat was a likely place by means of which they would gain entry. One result of the investigation was that by using ordinary methods we were unable to find that diphtheroid organisms were more prevalent in the throats of cases of general paralysis than in the throats of other forms of insanity. This observation and some others which were detailed in the paper, led us to assert that we had found no evidence of an etiological connexion between diphtheroid organisms and general paralysis.

Langdon,⁹ in America, has published a short account of some investigations on this subject, but he appears to have found a diphtheroid organism in only a very small percentage of cases of general paralysis.

So far as we are aware, no other workers have definitely investigated the matter, but the theory has been adversely criticized on general pathological and bacteriological grounds by such well-known names as Mott, Bulloch, and Ferrier.

In 1906 the present writers determined to approach the subject afresh. Ford Robertson and his colleagues had steadily maintained their original position, and constantly adduced new facts in support.

The evidence so far available in regard to this question was summarized by Ford Robertson in the Morison Lectures, 1906.

In 1901¹⁰ Robertson read a paper on the "Rôle of Toxic Action in the Pathogenesis of Insanity." In this paper he produced evidence of destructive toxic action in the tissues of the insane. He showed that in general paralytic there is constantly a severe chronic atrophic catarrh of the stomach or small intestine, or both, with excessive growth of bacteria.

In the same year Lewis Bruce showed that febrile attacks occurred every one to two weeks in cases of general paralysis, and these attacks were accompanied by leucocytosis. In the last stage of the disease he showed that this leucocytosis remained constant. These conditions, he thought, pointed to bacterial infection.

In 1903 Robertson, M'Rae, and Jeffrey¹¹ discovered that a diphtheroid organism is specially prominent in the gastro-intestinal and respiratory tracts, and asserted that it can frequently be isolated from the brain in cases of general paralysis.

Later on Robertson demonstrated the presence of a thread form of this organism in the tissues of general paralytics *post mortem*. Being now satisfied that these diphtheroid organisms were constantly associated with general paralysis, Robertson,¹² in conjunction with Shennan, fed rats on the organism.

As already indicated, only a short note has been published in regard to these experiments, but the investigators state that the animals exhibited signs of paresis, and that after death changes similar to those seen in general paralytics were found in the organs.

Still later,¹³ with improved methods of bacteriological technique, Robertson and his colleagues succeeded in finding the organism in almost all the tissues of the body, including the blood, urine, and cerebro-spinal fluid. The opsonic power of the serum of paralytic cases was then tested to these organisms, but the results appear not to have been very different from those given by normal serum. It was noted, however, that diphtheroid organisms ingested by leucocytes obtained from cases of general paralysis were more rapidly digested than were those ingested by normal leucocytes.

More recently, patients have been treated by anti-sera produced in various ways, and some of the cases have certainly shown some improvement. It must be noted, however, that most of these cases were far advanced with already well-marked destruction of cerebral cortex, and, therefore, only a moderate improvement was possible.

From these and other observations, Robertson's evidence appears to be as follows:—

- (i) There is an almost constant presence of diphtheroid organisms in cases of general paralysis.
- (ii) These organisms occur in the most diverse situations, viz., respiratory tract, the alimentary tract, in the genito-urinary tracts, in the blood, in the cerebro-spinal fluid, in the brain.
- (iii) The organisms are often present in one or other of these situations in enormous numbers.
- (iv) The organisms are more easily demonstrated as being present in the blood during congestive attacks.
- (v) The leucocytes of cases of general paralysis have a stronger digestive action on diphtheroid organisms than have the leucocytes of an ordinary person.
- (vi) The organisms, when administered to rats for a long period, produce in these animals illness characterized by marked paresis of the limbs, general bodily wasting, and mental lethargy.
- (vii) When the tissues of such rats are examined microscopically, there is evidence of infection by the organisms, and the histo-pathological changes are said at times to resemble those of general paralysis.

Let us consider these points as those which have been demonstrated in connexion with this problem. The question must now be asked—what is their significance? It can certainly be said that they do not prove general paralysis to be due to a diphtheroid organism, but they make it appear possible that these organisms may play some part in the production of the disease. It is a noteworthy fact that, in the discussion which took place at the Neurological Society in July, 1907, the main criticisms were directed against Ford Robertson's bacillus paralyticans being a true Klebbs-Löffler bacillus, not against the assertion of himself and his colleagues that this organism is exceedingly abundant in the body in cases of general paralysis. This tacit recognition of the correctness of their assertion that diphtheroid organisms can nearly always be found in some of the organs of a general paralytic, was demanded by the results of the long series of careful observations made by these workers. The one published inquiry of any extent under this head, of which we are aware, failed to show this constant association so far as the throat was concerned. Until similar extensive investigations show negative results for other organs and body fluids, the results of Ford Robertson and his co-workers must stand as correct.

We have arrived, then, at these facts—

- (1) That general paralytics are very often infected with an organism which can produce paresis and death in some of the lower animals;
- (2) That these organisms are not inert bodies, as is evident by the reaction of the body against them, a reaction made manifest by the increased lysogenic action of the blood;
- (3) That the condition of patients suffering from general paralysis has been improved by the administration of an immune serum produced against this organism.

It seems to us that this is as far as these workers have taken their case.

It is not to be expected, we think, that a general conviction should prevail that the cerebral changes found after death in the animals treated by these observers bore a very striking resemblance to those found in general paralysis. Had the changes been very striking, we would have expected to have seen them more fully described than has been the case; in particular, we should have looked for careful illustrations of the condition. It must be granted that the absence of such changes as are commonly found in the brains of general paralytics, from the brains of rats dying after a few weeks or months of illness, could not be held to negative the theory; but, on the other hand, were such changes found to be present, it would, undoubtedly, add a strong link to the chain of necessary evidence.

We may say, at once, that we consider that we have absolutely and definitely supplied such a link. A diphtheroid organism, isolated from a case of general paralysis, has been grown by us, has been injected into a rat; the animal has become paretic, feeble, and lethargic, and has then died. Its nervous system shows, in a marked degree, all the changes we are accustomed to regard as typical of general paralysis.

For a considerable time we had been making a collection of diphtheroid organisms and testing their biological reactions.

Out of this collection we selected the organism isolated from the patient, Rapson—a case of general paralysis. This organism was administered to animals as shown in the following tables.

The experiments were commenced in October, 1906, when a number of rats were obtained and treated as shown below:—

| Designation. | How Treated. | Date. | Condition. |
|-------------------------------------|-------------------------------------------------|--------------|------------------------------------------------|
| Rat I— (3 months' treatment) | 2.0 c.c. filtrate injected .. | 16 Oct., '06 | Quite healthy |
| | 2.5 c.c. „ „ .. | 20 „ '06 | „ „ |
|  | ..... | 23 „ '06 | Very weak |
| | 2.0 c.c. filtrate injected .. | 29 „ '06 | Much improved |
| | 1.5 c.c. „ „ .. | 7 Nov., '06 | Losing weight |
| | 3.0 c.c. „ „ .. | 8 Jan., '07 | Very excited, but healthy |
| | 3.0 c.c. „ „ .. | 15 „ '07 | Quiet and healthy |
|  | ..... | 23 „ '07 | Killed accidentally |
| Rat II.— (4 months' treatment) | Bouillon and living bacilli— | | |
| | 0.50 c.c. | 16 Oct., '06 | Quite healthy |
| | 0.50 c.c. | 20 „ '06 | Looked ill; right paw appeared cramped |
|  | ..... | 23 „ '06 | Very weak; right paw paralysed, right leg weak |
| | 0.60 c.c. | 29 „ '06 | Much improved |
| | 1.00 c.c. | 7 Nov., '06 | Healthy, but excited |
| | 0.75 c.c. | 8 Jan., '07 | „ „ |
| | 1.00 c.c. | 15 „ '07 | Healthy and quiet |
| | 0.75 c.c. | 23 „ '07 | „ „ |
| | 0.75 c.c. | 30 „ '07 | „ „ |
|  | ..... | 6 Feb., '07 | Died |
| Rat III.— (1½ months' treatment) | Fed on living bacilli in bouillon— | | |
| | 1.5 c.c. | 16 Oct., '06 | Beast healthy |
| | 1.5 c.c. | 20 „ '06 | Very excitable, but healthy |
| | 1.5 c.c. | 28 „ '06 | Quieter; hind legs weak |
| | 1.5 c.c. | 29 „ '06 | Lively and strong |
| | 1.5 c.c. | 7 Nov., '06 | Quieter; limbs weak |
| | 1.5 c.c. | 28 Dec., '06 | Died |
| Rat IV.— (1½ months' treatment) | Fed on living bacilli in bouillon— | | |
| | 4.0 c.c. | 8 Jan., '07 | Healthy and quiet |
| | 5.0 c.c. | 15 „ '07 | „ „ |
| | 2.5 c.c. | 23 „ '07 | „ „ |
| | 2.5 c.c. | 30 „ '07 | „ „ |
| | 2.5 c.c. | 13 Feb., '07 | „ „ |
| | 3.0 c.c. | 19 „ '07 | „ „ |
|  | ..... | 25 „ '07 | Died suddenly |
| Rat V.— (1 month's treatment) | Inoculated c filtrate of 10-day bouillon cult.— | | |
| | 1.5 c.c. | 23 Jan., '07 | Healthy |
| | 2.0 c.c. | 30 „ '07 | „ „ |
| | 1.3 c.c. | 13 Feb., '07 | Healthy, but excited |
| | 1.5 c.c. | 19 „ '07 | „ „ |
|  | ..... | 22 „ '07 | Died |
| Rat VI. | .. Escaped | | |

| Designation. | How Treated. | Date. | Condition. |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| Rat VII.— (1½ months' treatment) | Fed on organisms in bouillon— 1.3 c.c. 1.3 c.c. 1.0 c.c. 1.0 c.c. 1.0 c.c. 1.0 c.c. | 14 Mar., '07 18 " '07 20 " '07 22 " '07 9 April, '07 11 " '07 23 " '07 26 " '07 | Healthy " " " " " Paralysed in hind limbs and very ill Died |
| Rat VIII. .. | Escaped | | |
| Rat IX.— (11½ months' treatment) | Fed on bacilli in bouillon— 1.3 c.c. 1.3 c.c. 1.0 c.c. 1.0 c.c. 1.0 c.c. 1.0 c.c. 1.0 c.c. 1.0 c.c. 1.0 c.c. 1.0 c.c. 1.0 c.c. 1.0 c.c. 1.0 c.c. 1.0 c.c. 1.0 c.c. 1.0 c.c. 1.0 c.c. 1.0 c.c. | 14 Mar., '07 18 " '07 20 " '07 22 " '07 9 April, '07 11 " '07 23 " '07 26 " '07 30 " '07 10 May, '07 14 " '07 17 " '07 23 " '07 28 " '07 31 " '07 17 Sept., '07 25 " '07 1 Oct., '07 24 Feb., '08 | Healthy " " " " " Quiet " " " " " " " " " " " " Died |
| Rat X. .. | Still alive | | |
| Rat XI.— (15 months' treatment) | Injected with bacilli (Rapson) 0.3 c.c. 0.3 c.c. 0.3 c.c. 0.3 c.c. 0.3 c.c. 0.3 c.c. 0.3 c.c. 0.3 c.c. 0.3 c.c. 0.3 c.c. 0.3 c.c. 0.3 c.c. 0.3 c.c. 0.3 c.c. 0.3 c.c. 0.3 c.c. 0.3 c.c. 0.3 c.c. 0.3 c.c. | 14 Mar., '07 18 " '07 20 " '07 22 " '07 9 April, '07 11 " '07 23 " '07 26 " '07 30 " '07 10 May, '07 14 " '07 17 " '07 23 " '07 28 " '07 31 " '07 17 Sept., '07 25 " '07 1 Oct., '07 20 June, '08 | A solid mass formed at site of inoculation Quiet, looking miserable Died |

| Designation. | How Treated. | Date. | Condition. |
|-----------------------------------------------------|---------------------------------------------|---------------|-------------------------------------------------------------------------------------------------------------|
| Rat XII.— (9 months' treatment) | Injected \bar{c} bacilli (Rap.)— | | |
| | 0.3 c.c. | 14 Mar., '07 | |
| | 0.3 c.c. | 18 „ '07 | |
| | 0.3 c.c. | 20 „ '07 | |
| | 0.3 c.c. | 22 „ '07 | |
| | 0.3 c.c. | 9 April, '07 | |
| | 0.3 c.c. | 11 „ '07 | |
| | 0.3 c.c. | 23 „ '07 | |
| | 0.3 c.c. | 26 „ '07 | Hind legs weak; hair falling out |
| | 0.3 c.c. | 30 „ '07 | |
| | 0.3 c.c. | 10 May, '07 | |
| | 0.3 c.c. | 14 „ '07 | |
| | 0.3 c.c. | 17 „ '07 | |
| | 0.3 c.c. | 23 „ '07 | |
| | 0.3 c.c. | 28 „ '07 | Ulcer at site of inocula- tion |
| | 0.3 c.c. | 17 Sept., '07 | |
| | 0.4 c.c. | 25 „ '07 | |
|  | ..... | 1 Oct., '07 | |
|  | ..... | 25 Dec., '07 | Died. Being Christmas Day the animal was not found till next day, when decomposition had set in |
| Rat XIII. and XIV.— (2½ months' treatment) | Injected with diphtheroid Toxins (Rap.)— | | |
| | 1.0 c.c. | 14 Mar., '07 | Healthy |
| | 1.0 c.c. | 18 „ '07 | |
| | 0.5 c.c. | 20 „ '07 | |
| | 0.5 c.c. | 22 „ '07 | |
| | 0.5 c.c. | 9 April, '07 | |
| | 0.5 c.c. | 11 „ '07 | |
| | 0.5 c.c. | 23 „ '07 | |
| | 0.5 c.c. | 26 „ '07 | |
| | 0.5 c.c. | 30 „ '07 | |
| | 0.5 c.c. | 10 May, '07 | |
| | 0.5 c.c. | 14 „ '07 | |
| | 0.5 c.c. | 17 „ '07 | |
| | 0.5 c.c. | 23 „ '07 | |
| | 0.5 c.c. | 28 „ '07 | |
| | 0.5 c.c. | 31 „ '07 | Died on same day, prob- ably from cold |
| Rat XV.— (2½ months' treatment) | Injected \bar{c} diphtheroid toxin— | | |
| | 1.0 c.c. | 14 Mar., '07 | Healthy |
| | 1.0 c.c. | 18 „ '07 | |
| | 0.5 c.c. | 20 „ '07 | |
| | 0.5 c.c. | 22 „ '07 | |
| | 0.5 c.c. | 9 April, '07 | |
| | 0.5 c.c. | 11 „ '07 | |
| | 0.5 c.c. | 23 „ '07 | |
| | 0.5 c.c. | 26 „ '07 | |
| | 0.5 c.c. | 30 „ '07 | |
| | 0.5 c.c. | 10 May, '07 | |
| | 0.1 c.c. | 14 „ '07 | |
| | 0.6 c.c. | 17 „ '07 | |
| | 0.6 c.c. | 23 „ '07 | |
| | 0.5 c.c. | 28 „ '07 | Died |
| | 0.5 c.c. | 31 „ '07 | |

As will be noticed, only four of the rats survived for any great length of time. Of these, one (Rat XII.) was lost through dying on a holiday in hot weather, and decomposing before being found; two (Rats IX. and XI.) were subjected to careful *post mortem* investigation, and one still lives (Rat X.).

The pathological changes found in the tissues, *post mortem*, were as follows:—

HISTOLOGICAL CHANGES.

| | Brain. | Lungs. | Liver. | Kidneys. | Other Organs. |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Rat I. (3 months) | No marked change; organisms in pia and brain | Intensely engorged with patches of irregular consolidation | Congested .. | Acutely congested; patches of small-cell infiltration | ..... |
| Rat II. (4 months) | Pia thickened in places; numerous organisms—some like KLB | Alveoli in parts filled with homogeneous material; blood-vessels engorged | No change .. | Slight cloudy swelling | Heart and intestine normal |
| Rat III. (1½ months) | Numerous organisms, especially where pia is thickened and in the sheaths of blood-vessels | No note .. | Slight increase of cellular elements around portal tract | Congestion of glomeruli; sections show masses of inflammatory exudation | ..... |
| Rat IV. (1½ months) | Organisms noticed | Alveolar walls thickened; blood-vessels engorged; many spaces contain red blood-cells | No change .. | Slight parenchymatous nephritis | ..... |
| Rat V. (1 month) | Pia thickened; lining of ventricles thickened; no germs seen | A few alveoli filled with blood; patches of small-celled infiltration | No change .. | Acutely congested | Peripheral nerves healthy; intestine healthy; spinal cord normal |
| Rat VI. | | | Escaped | | |
| Rat VII. (1½ months) | | | Tissues lost through accident | | |
| Rat VIII. | | | Escaped | | |
| Rat IX. (11½ months) | Blood-vessels show marked congestion | In many parts consolidated or collapsed; exudation products fill the alveoli, much congestion | Slight congestion | Not markedly altered | ..... |
| Rat X. | | | Living still | | |
| Rat XI. (15 months) | Overgrowth of neuroglia periaarteritis; increase numerically vessels of cortex cerebri and cerebellum; intense engorgement of blood-vessels in pia cerebri and cerebellum; degeneration of nerve-cells | Part showed consolidation | No interstitial change; no increase in the connective tissue; there is considerable amount of parenchymal degeneration, especially in the whole of the central and intermediate zone; blood-vessels congested | No interstitial change; capsule normal; advanced cloudy swelling of convoluted tubules; blood-vessels engorged | Spinal cord shows a considerable number of degenerated nerve fibres; engorged blood-vessels; nerve-cells fewer and some somewhat degenerated |

HISTOLOGICAL CHANGES—*continued.*

| — | Brain. | Lungs. | Liver. | Kidneys. | Other Organs. |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|--------------------|----------------------------------------------------------------------------------------|---------------|
| Rat XII. | | | Tissues all lost | | |
| Rat XIII. (2½ months) | Pia matter contains organisms like Rapson's bacillus; a few of same organisms in brain substance; pia thickened and fixed to cerebrum; increased peri-vascular infiltration; engorgement of blood-vessels | Congested .. | No marked change | .. | ..... |
| Rat XIV. (2½ months) | Pia thickened and more cellular; many organisms visible; neuroglia cells greatly hypertrophied, and very numerous, both near cortex and near ventricles; engorged blood-vessels | Some consolidation, with thickened pleura and round cell infiltration near bronchioles | .. | Capsules thickened in places; vessels engorged; small areas of round-cell infiltration | ..... |
| Rat XV. (2½ months) | Vessels engorged; sub-pial felting; many spider cells together with definite increase of neuroglia | Much engorged; shows areas of consolidation | Slightly congested | con- Indication of cloudy swelling of convoluted tubules | ..... |

In February, 1907, and succeeding months, injections were made into a rabbit, as shown in the table:—

| Designation. | How Treated. | Date. | Condition. |
|--------------|----------------------|---------------|---------------|
| Rabbit I. .. | 1.3 c.c. injected .. | 19 Feb., '07 | Quite Healthy |
| | 1.3 c.c. " .. | 5 Mar., '07 | " |
| | 1.0 c.c. " .. | 11 " '07 | " |
| | 0.6 c.c. " .. | 14 " '07 | " |
| | 0.6 c.c. " .. | 18 " '07 | " |
| | 0.6 c.c. " .. | 20 " '07 | " |
| | 0.6 c.c. " .. | 22 " '07 | " |
| | 0.6 c.c. " .. | 9 April, '07 | " |
| | 0.6 c.c. " .. | 11 " '07 | " |
| | 0.6 c.c. " .. | 23 " '07 | " |
| | 0.6 c.c. " .. | 26 " '07 | " |
| | 0.6 c.c. " .. | 30 " '07 | " |
| | Ol. Ricini " .. | 10 May, '07 | Distended |
| | 0.6 c.c. " .. | 28 " '07 | Quite healthy |
| | 0.6 c.c. " .. | 31 " '07 | " |
| | 0.6 c.c. " .. | 17 Sept., '07 | " |
| | 0.6 c.c. " .. | 25 " '07 | " |
| | 0.6 c.c. " .. | 1 Oct., '07 | " |

This animal still survives and is in good health.

Of the cases above tabulated, none can compare in importance—judged by the standard of results—with that designated as Rat XI.

It can be stated generally that the tissues of nearly all the other rats show something of the changes which are so conspicuous in the tissues of Rat XI.

Our results were controlled by the observation of a very large number of sections of the brains of normal rats.

In the cerebral tissues of Rat XI. we were greatly surprised to find such marked changes.

In the cortex cerebri we found small areas occupied by newly-formed neuroglia cells, whose thick abundant processes interlaced with one another, forming a dense feltwork. All the nerve cells of such an area had been completely destroyed. In many other parts of the cerebrum the neuroglial overgrowth was not so prominent, but was none the less real.

In the pons and medulla there was found in places a truly remarkable increase in recent neuroglial elements. This increase consisted here of large numbers of more or less isolated spider cells, whose cell-bodies were not sufficiently near to one another for their processes to form a feltwork such as we found in the cortex cerebri. In the cerebellum the increase was very marked, and quite similar to that found in the medulla and pons. Even in the peripheral portions of the spinal cord sections an increase of neuroglial elements could be noticed.

Over almost all parts of the brain the pia-arachnoid was much thickened, and showed marked infiltration with lymphocytes.

The ependymal changes in the ventricles were the least marked, but a definite increase in the number of layers of ependymal cells lining the ventricles was apparent, together with an increase in patches of the neighbouring neuroglia.

The vascular changes were characterized by an irregularity in the course of the smaller vessels, which often showed numerous branches of neuroglial cells attached to them. The larger vessels showed in some instances beautifully marked typical peri-arteritis. One very marked vascular change, which was so noticeable when a comparison with the normal was made, consisted of a great increase in the number of capillary loops seen in sections, especially of the cerebellum. Another feature was the great apparent increase in the number and size of the vessels entering the cortex.

So far as the nerve-elements themselves were concerned, there was a general diminution in number of the neurones throughout the cortex, and an absolute destruction of them *en masse* in those situations occupied by the neuroglial patches already referred to.

In the other organs there were also well-marked evidences of toxic action. In the lungs broncho-pneumonic patches were common; congestion of the liver, with slight increase of fibrous-elements, was observed in many cases; while the renal changes included cloudy swelling of the convoluted tubules and patches of lymphocyte invasion.

From a consideration of these changes we feel that whatever bearing this work may have on views as to the part played by diphtheroid organisms in the etiology of general paralysis of the insane, the fact has been established that diphtheroid organisms administered in a suitable way over a long period can produce marked cerebral changes, the chief of which are overgrowth of neuroglia, peri-arteritis, chronic thickening of the pia-arachnoid, and destruction of neurones.

In conclusion, we would state our views in regard to the etiology of general paralysis thus:—

1. In the vast majority of cases syphilis is the primary cause.
2. There is an increasing amount of evidence to show that some forms of diphtheroid organisms may play a considerable part in the production of the pathological picture.

LITERATURE.

1. Erb—Berliner Klin. Wochenschrift, 1904.
2. Ferrier—B.M.J., 1906.
3. Mott—Archives of Neurology.
4. Chase—General Paresis, 1902.
5. Wasserman and Neisser—Deut. Med. Woch., 1906.
6. Wasserman and Plaut—Deut. Med. Woch., 1906.
7. Eyre and Flashman—Archives of Neurology, Vol. III.
8. Ford Robertson—B.M.J., 1905.
9. Langdon.
10. Ford Robertson—B.M.J., 1901.
11. Ford Robertson, M'Rae, and Jeffrey—Review of Neurology and Psychiatry, 1903.
12. Ibid.
13. Ford Robertson—Review of Neurology and Psychiatry, 1906.

DISCUSSION.

PROFESSOR BERRY said he certainly did not speak with the authority of a pathologist, but he could not help being struck with the brain sections that Dr. Flashman and Dr. O. Latham exhibited. To have produced changes in the brain of a rat similar to those of general paralysis by feeding it on organisms gathered from various tissues of general paralysis was indeed a triumph. For himself, he was tired of the generalization that dragged in syphilitis to account for fibrosis of viscera and corresponding changes in the brain. He welcomed the work of Dr. Flashman and Dr. Latham as something that would go a great way to elucidate some of those gross changes, cerebral and otherwise, that are at present of so obscure etiology.

DR. BULL (Melbourne) was greatly struck with the fine sections of brain exhibited by Dr. Flashman. There was no doubt of the pathological changes produced by long continued feeding on diphtheroid organisms. Of course, great pains would have to be taken to see that these were the only organisms the rats were getting all the time, and that control rats be observed under precisely similar conditions—not an easy task.

DR. MACKEDDIE (Melbourne) said, if he were asked to diagnose the brain sections presented by Drs. Flashman and Latham, he would unhesitatingly say they were from a case of general paralysis. The neurological and vascular changes were identical with those in general paralysis. As Dr. Bull drew attention to the care required in controlling such experiments, he would further point out that another series of control animals, fed with other organisms, would be of the utmost value. If changes such as these could be produced by organisms, he wondered where syphilis came in at all as a cause of such gross brain pathology.

DR. DAVIDSON (Sydney) agreed with Dr. MacKeddie that the next step would be the feeding of rats on organisms other than diphtheroids. He would point out that Drs. Flashman and Latham do not say that they have produced general paralysis in rats, but only that the condition of cerebral cortex that they produced by feeding on diphtheroid organisms is exactly similar to that of general paralysis. He did not think further investigation would show that the characteristic changes in general paralysis can be produced apart from syphilis.

DEMONSTRATION IN FREEZING HISTOLOGICAL METHODS.

OLIVER LATHAM, M.B., M.Ch.,
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By most busy practitioners, and even residents of country hospitals, the subject of pathology is considered rather one for the specialist. How, then, can you find some dry details of pathological technique interesting? However, there may be some among you, who, like myself, have desired to study pathologically cases which have been of interest clinically, and have been deterred, believing that expensive and time-involving methods and instruments were necessary; such as are indeed required by celloidin and paraffin methods. Imagine my pleasure then when I found that Ford Robertson, to whom I was introduced by Dr. Flashman, used the frozen method almost entirely—at least, for nervous tissue and his special methods in his classic work—and now, since the application of Wright's method of affixing sections to slides has been proved generally practical, the frozen method has become much more extended in its usefulness, anyhow, for most pathological conditions, and I am not concerned with zoologists' needs. So that much useful work can be done in a laboratory fitted up at an expense of £25, including microscope. My section-cutter and centrifugal machine cost 30s. each.

Wright's method is applicable, besides ordinary organs, to tissues too delicate for ordinary manipulation, such as cystic tumours, curettings, lungs, transverse sections of small brains, *e.g.*, rats, gliomas, and, if the tissue be still too delicate, it can be soaked in gelatin, which hardens in formalin, and hardly interferes with the staining.

WRIGHT'S METHOD.

Pieces of tissue—say, of a tumour—are cut, best not exceeding $\frac{1}{4}$ -in. or $\frac{1}{8}$ -in. thick, as fresh as possible, and placed in 10 per cent. of commercial formalin in normal saline for 24 hours, or indefinitely. Wright then freezes and cuts, but much better results are obtained by transferring the tissue to dextrin solution (Appendix I.) for at least four hours, or indefinitely (process of penetration hastened by incubating). The soaked tissue is placed on stage of microtome with plenty of dextrin solution, frozen, and cut, the numerous sections being held together by the dextrin till they float apart in water. Choosing the thinnest and most perfect section, one either floats it on to a clean slide at once, or first passes it through methylated spirit, and then back to water, where it spreads out evenly.

Having got the section on a slide (*a*) drain off superfluous water; (*b*) blot with several thicknesses of fluff free blotting-paper; (*c*) flood with absolute alcohol; (*d*) pour off in few seconds, and, before section becomes

dry, flood it with a solution of celloidin, in equal parts alcohol and ether (Appendix II.); (e) pour off in a second, breathe on section, and plunge whole into water. The section can now be stained on the slide by any of the ordinary stains, I prefer Ehrlich's hæmatoxylin, followed by vangiesen or watery eosin. The slide will even stand boiling for tubercle bacilli.

The section is cleaned and mounted thus—

- (a) After washing in water after the last stain used, blot with several thicknesses of fluff free blotting-paper;
- (b) Pour over section plenty of absolute alcohol, pour off after a few seconds;
- (c) Before latter is quite dried off, flood the section with oil of origanum—in cold weather this can be slightly warmed. If too much white appears in the section or celloidin surrounding it, again flood the section with absolute alcohol, and repeat the oil of origanum;
- (d) Wash off oil of origanum with xylol; and
- (e) Mount in xylol balsam.

Sometimes I affix the section to a cover glass, instead of slides, especially when doing sections of nerves by Weigert's method.

Thus a piece of tumour can be fixed, cut, stained, and mounted in 24 hours, or, without fixing, in a few minutes.

Now, in treating sections of the central nervous systems, it is often quite enough to stain them in watch glasses, or just blotted on the slide. However, even then I sometimes stain sections in glasses, *i.e.*, different parts of cord or brain, and, after differentiating and washing, fix six on one slide by Wright's method, clear all together, and cover with one cover glass, thus saving five coverslips and slides and much time.

Only oil of origanum or xylol carbolic crystals can be used after affixing by Wright's method.

As a general fixture for all tissues, I prefer ten parts commercial formalin (which is 40 per cent. formaldehyde) to 90 parts of normal saline, because one can stain nerve cells, neuroglia, medullated fibres, ordinary tissues, and germs in tissues after this fixature. Nevertheless, one prefers tissues fixed in 96 per cent. alcohol for nerve cells and germs in tissues; in muller for Marchi's method; and in sublimate for Ford Robertson's neuroglia stain.

NERVE TISSUES.

Received in formalin, are cut not more than $\frac{1}{8}$ -in. thick, and placed in Weigert's Mordant No. I for five days (Appendix III.), then transferred to Weigert's Mordant No. II. for two days, or indefinitely. After this, soaked in dextrin solution, and frozen and cut. The sections can be used at once, or kept indefinitely in Weigert's Mordant II. (Appendix IV.).

These nerve-system sections are now ready for the following stains:—

- (a) Weigert's medullated nerve fibre stain.
- (b) Robertson's modification of Heller's osmic acid stain.
- (c) Nissl's nerve cell stain.
- (d) Ordinary hæmatoxylin eosin for connective tissue and blood vessels.

I find the most reliable medullated nerve stain is Weigert's old dithurm hæmatoxylin. Stain loose sections in watch glass over night, wash well, differentiate in his Weigert's borax ferricyanide for five to ten minutes, wash well, and simply blot on slide, clearing as usual by alcohol absolute, origanum, xylol, and xylol balsam. The nerves are blue black, and the degenerated areas and ground tissues golden.

If a white background is wanted, as for gliomas, for counterstaining, Weigert recommends his iron hæmatoxylin method, only remember his Liquor ferri sesquichloridi is German, and is equal to the English Liq. ferri perchlor. fort. two parts to water one part. I find this gives excellent results.

NERVE CELLS.

Use either some of the Mordant II. sections, or, better, those preserved or fixed in sublimate, or 96 per cent. alcohol—

- (a) Place, that is, float a section from water, on to a slide, blot, and stain ten minutes in either Nissl's stain or 1 per cent. methyl blue, or thionin, or toluidin blue, pour off the stain, and
- (b) Decolorize with alcohol absolute, nine parts, to aniline, one part, and *watch the process* under the microscope. As soon as the granules appear in nerve cells, or (if you are staining for organisms by carbol thionin) only the nuclei are visible, pour off the aniline alcohol. Blot, and
- (c) Flood the section with equal parts pure turpentine and benzole, pour off and flood again; this time heating the slide with plenty of turpentine benzole on two copper bars over a copper sheet for ten minutes with small spirit lamp underneath, renewing turpentine benzole as it tends to evaporate;
- (d) Wash off the turpentine with pure benzole, and mount in benzole or xylol balsam.

FORD ROBERTSON'S NEUROGLIA PROCESS.

Rest.—Tissues fixed 24 hours in saturated sublimate in normal saline, then transferred to 70 per cent. alcohol yellow with Tr. iodide, changed twice, and then kept in 80 to 90 per cent. alcohol. Freeze, and cut as above.

Stain sections ten minutes in methyl violet, wash few seconds, steep in saturated iodine in 3 per cent. potash iodide 10 minutes, wash another ten minutes, float on to slide and blot. Flood section with turpentine benzole, as in last paragraph, and heat well, only before washing off with pure benzole add plenty of aniline oil one part, benzole two parts, mixture, to remove excess of colour, then wash with benzole, and mount quickly in benzole balsam.

This delicate turpentine benzole method of Ford Robertson's is unrivalled for not extracting the aniline colours, and is the only one possible for his neuroglia stain, so important in pathology of general paralysis.

Finally, in studying surfaces like dura and pia mater and pleura. &c., Robertson does his surface section method, *i.e.*, freeze some dextrine on the stage of a microtome, shave off the surface till it is smooth, squeeze down on this surface the side of pia one wants to examine, freeze again, and cut off the upper layers until only the surface you want remains, float this into water, and mount.

There are specimens on the desk exhibiting examples of these simple methods, and if any of you are encouraged to do some pathological work on your own, recognising how few instruments are needed, I may not consider I have employed your time in vain.

REFERENCES.

Pathology of Mental Diseases—Ford Robertson. *Pathological Technique*—Mallory and Wright. *Microscopists' Vade Mecum*—Lee, and various autograph letters.

Appendix I.—One part of dextrin by weight is boiled up with two parts by weight of water and filtered, and 1 per cent. carbolic acid added.

Appendix II.—The ordinary celloidin solution of an opalescent appearance found in laboratories is usually made by dissolving some celloidin in equal parts of absolute alcohol and ether. To make *our* solution one takes about a teaspoonful of this solution and adds it to 4 ozs. of equal parts alcohol and ether, more or less. To test the distilled mixture, pour some on a slide, pour off at once, and plunge into water. Judge by the invisibility of the film of celloidin left behind whether the solution is too thick or thin.

Appendix III. and IV.—

Weigert's Mordant I.—

| | | | | |
|----------------------|-----|-----|-----|-----|
| Bichromate of potash | ... | ... | ... | 5 |
| Flourchrom | ... | ... | ... | 2 |
| Water to | ... | ... | ... | 100 |

Weigert's Mordant II.—

| | | | | |
|---------------------------|-----|-----|-----|-----|
| Copper acetate | ... | ... | ... | 5 |
| Acetic acid, 36 per cent. | ... | ... | ... | 5 |
| Flourchrom | ... | ... | ... | 2.5 |
| Water at | ... | ... | ... | 100 |

Appendix V.—Sections of brain preserved in formalin can be soaked in 1-1000 palladium chloride for a day, or passed through sublimate, and do very well for neuroglia.

RECEIVING HOUSES.

W. ERNEST JONES, M.R.C.S.,

Inspector-General of the Insane in Victoria.

The use of receiving houses, that is to say, houses established specially for the observation of doubtful cases of mental disorder, is almost entirely of Australian origin, although something analogous exists, and has existed for many years, in England and Scotland, in the lunacy wards attached to the workhouses, infirmaries, and poor houses. The latter, however, do not fulfil all the uses that the receiving house can be put to; neither are they independent institutions, nor do the terms for which patients can be received correspond.

The origin of receiving houses is to be credited to the enterprise of the late Dr. Norton Manning, for many years the Inspector-General of the Insane in the State of New South Wales, and their inception was due to the fact that the procedure for the reception of persons of unsound mind into an institution for the insane was so closely associated with the Police Court, that to be regarded as insane was much the same thing as being a criminal.

One is deeply impressed with this fact when interviewed by patients in our State hospitals for the insane, inasmuch as very many bitterly complained that they have been hauled before the Court, although they had committed no crime, and yet they were subsequently committed on a charge of being a lunatic, although "of course there was nothing the matter with their brain." If there was any doubt, the person so charged was remanded to a prison or police station for medical observation.

To obviate this disgrace, the receiving house was created, and unquestionably it has most usefully fulfilled the functions for which it was created. It is possible also for the police of New South Wales to arrest

and take to the receiving house any case that is considered to be deranged in mind or wandering at large, without any preliminary steps in the way of certification. But it is necessary that the person so arrested should be taken before a Court, in order that his detention may be confirmed or his discharge granted. In all this, the police element pervades the whole procedure.

In Victoria, the methods quite recently established by the Lunacy Act of 1903 are somewhat different, as, although the Act permits of the reception for observation of a person sent from a Police Court, it does not permit of a patient being admitted without some certificate from a medical practitioner; but it does permit of the reception of a doubtfully insane person through other channels than those of the police station or Court, inasmuch as, on the application of any responsible person, accompanied by two modified medical certificates, a person whose mental condition is apparently unsound, may be admitted therein for a period of one month, which may, under certain conditions, be extended for a further period. It is obvious, therefore, that the provisions in Victoria permit of the use of the receiving house for curative as well as observation purposes, and the Melbourne Receiving House, about to be described, has been arranged for that double purpose.

When I came to Victoria, early in 1905, there were three lunacy wards. They were small, unsuitable buildings, containing from four to six rooms, meagrely furnished, with very poor lavatory, bath, and kitchen accommodation, and with tiny walled-in back yards for airing courts. They were attached to, and staffed by, the General Hospitals at Bendigo, Geelong, and Castlemaine. The latter two wards were but rarely used, and the last named has since been given up. At Bendigo, some 60 to 80 patients were received annually, and were detained for a period of a few days up till a month, and only occasionally as long as six weeks. About one-third of these cases did not go on to the hospitals for the insane, and after having made various appearances at the Police Court, the patients sent to the ward for detention were either discharged, or fully certified and sent on to one of the State hospitals for the insane. The majority of those discharged recovered were cases of acute alcoholism, although of the number admitted to the lunacy ward a few cases of attempted suicide were usually received. Such treatment as was possible was given; but only in the case of very evanescent disorders were recoveries returned.

The only other places in Victoria, where doubtful cases could be received were the gaols in the country, and the Gaol Hospital, in Melbourne, with this exception, that, in a few instances, patients were admitted into the wards of certain general hospitals, such as the Melbourne Hospital.

A visit to New South Wales convinced me of the fact that in the latter State their methods were the better, and that their Receiving House in Sydney was doing very good work, although it was dealing largely with police cases, alcoholics especially; and that, whilst approximately one-half of the police cases were discharged in a few days, quite an insignificant number of the patients admitted under lunacy certificates were treated for such a period of time as would enable them to be discharged as recovered. Let us take, for example, the year 1906—752 police cases were admitted, and 347 discharged; whilst out of 171 admitted under lunacy certificates, only five were discharged as recovered; whilst of the police cases, it appears that nearly one-half were cases which would, in any event, have been sent on to the hospitals for the insane.

PLAN OF RECEIVING HOUSE

ROYAL PARK MELBOURNE

GROUND FLOOR

- 1 Boiler House 13 Larder 25 Sitting Room
- 2 Coal House 14 Private Pantry 26 Dining Room
- 3 Wash House 15 Surgery 27 Scullery
- 4 Laundry 16 Telephone Room 28 Linen Closet
- 5 Drying Room 17 Kitchen 29 Padded Cell
- 6 W.C. 18 Drying Room 30 Single Rooms
- 7 Kitchen 19 Dining Room 31 Lavatory
- 8 Scullery 20 Waiting Room 32 " "
- 9 China Pantry 21 Office 33 Bath Room
- 10 Pantry Room 22 W.C. 34 W.C.
- 11 Cook's Room 23 Examination Rm 35 Dormitory
- 12 Stores 24 Attendants Room 36 Day Room.

SCALE 40 FEET TO AN INCH



- FIRST FLOOR
- 37 Linen Cupboard
 - 38 Bath Room
 - 39 " "
 - 40 Cook's Bed Room
 - 41 Bed Room
 - 42 Laundry Bed Rm
 - 43 Staircase
 - 44 Matrons' Bed Rm
 - 45 " " Bed Rm
 - 46 Dressing Room
 - 47 Bed Room
 - 48 " "



In organizing and planning the Receiving House at Melbourne, an attempt has been made to deal with cases of mental disorder rather than with the observation of police cases, and in this it may be claimed that some little success has been obtained, as will be seen from the accompanying statistics, especially Table V., which sets forth the diagnosis of the mental disorder in the cases received.

In describing the Receiving House at Melbourne, one should, perhaps, mention first of all that a suitable site was difficult to obtain, and, further, that the area of ground was barely large enough, and the conformation of the site was of such a character that ideal orientation could not be obtained; neither could the original plan of the building be carried out in its entirety. However, the male side has been carried out faithfully, and the only discrepancies from the original plan (reproduced) appear on the female side.

The building consists of a central administrative block and two wings. In the former are contained a small compact residence for the officer in charge, offices, waiting rooms, a dispensary, and quarters for the matron in front. Behind are the kitchen, scullery, laundry, and boiler house. From the middle of the centre block, broad, half-open verandahs lead into the wards; that is to say, verandahs on the weather side, half brick and glass, and, on the other side, open wire work. In the wards, a central corridor lighted from the top has, on one side, dining rooms for the staff and patients, a scullery, a clothes store, and a bedroom for the charge attendant; on the other side is an examination room, with a bed, a bath, and lavatory basin. Next this there are two bedrooms for the staff, then four single rooms for quiet patients not needing continuous observation.

From the corridor two doors open, one into the day room and one into the dormitory. The day room is a very bright room, with ample windows and window seats. The dormitory is also very bright, and affords accommodation for twelve patients, and at the end of it are four single rooms, one being padded and with a divided door. Both the dormitory and day room open into a well-ventilated sanitary spur, the connecting corridor of which opens into an airing court. The spur contains a dressing room, a bath room, with a plunge bath, as well as a nicely-arranged shower bath, good lavatories, and W.C.'s. of the latest cantilever pattern. Everything has been done to make this block sanitarily perfect; the floors and walls nicely tiled, and a good pattern of lavatory basin adopted, a plunge bath, fitted with Doulton safety valves, and the shower bath has a thermometer fixed in the delivery pipe, to regulate the heat of the water. Between the day room and dormitories a very artistic lead glass screen has been placed, thereby giving brightness and decoration impossible to obtain with ordinary walls.

In the internal corridors wood pulp flooring has been laid on concrete, presenting a warm effect and being practically noiseless. Great care has been exercised throughout in the ventilation, especially with the single rooms, the windows of which are provided with shutters, which lock back into the side wall. The lighting is electric throughout, and telephones are placed everywhere. Outside the various blocks are fire hydrants, from which an excellent pressure is always obtainable. Internally chemical extinguishers are relied on to deal with any fire emergency.

It has already been said that the plan proposed to build on had to be modified, and this for several reasons. The total cost of the building was nearly £14,000, and that may be taken as being a very high figure. I had hoped to have had this building erected for some £10,000 to £11,000; but it was found necessary to modify in some particulars our requirements, and this was done principally in dealing with the female wing—for, taking Darlinghurst and its numbers as a guide, I found that the number of female admissions was barely half that of the males. I have occasionally to regret that I permitted any departure from my original plan, and which I send for reproduction. I must confess that I have made a mistake in not having a verandah built along the western front of the wards; in omitting this I was biased by the fact that the verandahs in most of our State hospitals, built as they are on both sides of the long gallery wards, cut off so much light and interfere so much with the through ventilation, that I determined (wrongly I think now) to dispense with their assistance.

Statistics.—I have taken the year that has elapsed since the Receiving House was opened, that is to say, 24th September, 1907, to 23rd September, 1908, inclusive. We have admitted 339 cases (184 male, 145 female), but of these three males and seven females were re-admissions during the year, so that we have dealt with 329 persons. Of the 339 cases, 128 (72 male and 56 female) have been discharged recovered, two males and two females relieved, and three males and two females not improved. One patient (a male) died. He was admitted very seriously ill, and died a few hours after admission. One hundred and eighty-four (100 males and 84 females) were transferred to the State hospitals, so that we have 128 successes to set against 184 failures, and, when we consider that among the latter number we have had 26 general paralytics, a few imbeciles and senile demented, and a considerable number of epileptics (21), I think we may assume that the Receiving House has (considering the fact that a two months' stay is the longest period possible) carried out its intention in a reasonably satisfactory manner.

With regard to the cases received, mild cases of melancholia have given us good results, and I would remark in passing that we admitted no less than 101 cases of suicidal intent, and some of them undoubtedly bad cases; and of our failures in this respect, I have to own up to the fact that two men and one woman some time subsequent to discharge succeeded in encompassing their own destruction. Our best results were from cases of alcoholism, principally amongst the men, and hystero-mania amongst the women.

As to causation, as usual in this State, reported heredity ranks very low, only 44 cases out of 339 giving a hereditary history of insanity. Alcoholism is the most important factor, 58 cases show alcohol as a factor. Ill-health and mental anxiety or overwork account for 54 and 28 cases respectively. Previous attacks were noted in 27 cases. The average age of the admissions was 42 years.

I feel that the institution of receiving houses in English towns, having a population of 100,000 or more, would prove the solution of many of the difficulties of dealing with recent cases of mental disorder amongst the working classes. Such a house could be run in connexion with an infirmary, or a general hospital, or even an asylum for the insane, if it be reasonably accessible to the centre of population; but it is essential that the medical officer in charge should have had a

thorough training in the treatment of mental disorders. In passing, one might mention that such a necessity would provide openings for the assistant medical officers of large institutions, who have at present far too long a period of waiting to look forward to ere they can meet with a reasonable reward. A very desirable adjunct to the receiving house would be a convalescent home in the country, wherein the recently recovered could be received for an easy probationary period, before returning to the struggle for existence. I feel sure that the institution of these methods would greatly reduce the number of the insane in the asylums and State hospitals of English speaking communities, and incidentally lower the cost of the maintenance of the chronic insane, as there would be less necessity to provide elaborate accommodation in the large State asylums.

I attach statistics, drawn up in much the usual way, to show the number of patients admitted and discharged, as well as the causes of, and kinds of, mental disorder amongst our patients.

RECEIVING HOUSE, ROYAL PARK.

TABLE I.—Showing the Admissions, Re-admissions, Discharges, and Deaths during the year ending 23rd September, 1908.

| | Male. | Female. | Total. | Male. | Female. | Total. |
|---------------------------------------------------------|-------|---------|--------|-------|---------|--------|
| Cases admitted— | | | | | | |
| First Admissions | 184 | 145 | 329 | | | |
| Not First Admissions (Re-admissions) | 3 | 7 | 10 | | | |
| Total Cases Admitted during the year .. | .. | .. | .. | 187 | 152 | 339 |
| Total Cases under care during the year .. | .. | .. | .. | 187 | 152 | 339 |
| Cases Discharged— | | | | | | |
| Recovered | 72 | 56 | 128 | | | |
| Relieved | 2 | 2 | 4 | | | |
| Not Improved | 3 | 2 | 5 | | | |
| Died | 1 | .. | 1 | | | |
| Transferred from the Institution .. | 100 | 84 | 184 | | | |
| Total Cases Discharged and Died during the year | .. | .. | .. | 178 | 144 | 322 |
| Remaining in the Asylum 23rd September, 1908 | .. | .. | .. | 9 | 8 | 17 |

TABLE II.—Showing the Length of Residence in those Discharged, Recovered, and in those who have Died, during the twelve months ended 23rd September, 1908.

| Length of Residence. | Recovered. | | | Died. | | |
|-------------------------------|------------|---------|--------|-------|---------|--------|
| | Male. | Female. | Total. | Male. | Female. | Total. |
| Under 1 month | 55 | 41 | 96 | 1 | .. | 1 |
| 1 month and under 2 months .. | 17 | 15 | 32 | | | |
| Total | 72 | 56 | 128 | 1 | .. | 1 |

TABLE III.—Showing in Quinquennial Periods the Ages of those Admitted, Recovered, and Died during the year 1907-8, and of those remaining on 23rd September, 1908.

| Ages. | The Admissions. | | | Recovered. | | | The Deaths. | | | Patients Resident, 23rd September, 1908. | | |
|----------------------------|-----------------|---------|--------|------------|---------|--------|-------------|---------|--------|---------------------------------------------|---------|--------|
| | Male. | Female. | Total. | Male. | Female. | Total. | Male. | Female. | Total. | Male. | Female. | Total. |
| 5 years and under 10 years | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 10 " | 1 | 1 | 2 | 1 | .. | 1 | .. | .. | .. | .. | .. | .. |
| 15 " | 6 | 3 | 9 | 2 | .. | 2 | 1 | .. | 1 | .. | .. | .. |
| 20 " | 17 | 21 | 38 | 8 | 9 | 17 | 1 | .. | .. | 2 | 1 | 3 |
| 25 " | 14 | 14 | 28 | 5 | 3 | 8 | .. | .. | .. | 1 | 2 | 2 |
| 30 " | 18 | 16 | 34 | 6 | 7 | 13 | .. | .. | .. | 1 | 1 | 2 |
| 35 " | 33 | 21 | 54 | 10 | 10 | 20 | .. | .. | .. | 2 | 3 | 5 |
| 40 " | 24 | 24 | 48 | 10 | 12 | 22 | .. | .. | .. | 2 | 1 | 3 |
| 45 " | 36 | 23 | 59 | 15 | 10 | 25 | .. | .. | .. | .. | .. | .. |
| 50 " | 12 | 14 | 26 | 4 | 3 | 7 | .. | .. | .. | 1 | .. | 1 |
| 55 " | 9 | 3 | 12 | 4 | .. | 4 | .. | .. | .. | 1 | .. | 1 |
| 60 " | 3 | 2 | 5 | .. | 1 | 1 | .. | .. | .. | .. | .. | .. |
| 65 " | 6 | 5 | 11 | 5 | 1 | 6 | .. | .. | .. | .. | .. | .. |
| 70 " | 4 | 1 | 5 | 1 | .. | 1 | .. | .. | .. | .. | .. | .. |
| 75 " | 4 | 1 | 5 | 1 | .. | 1 | .. | .. | .. | .. | .. | .. |
| 80 " | .. | 1 | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 85 " | .. | 2 | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 90 " | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 100 " | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Unknown | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Total .. | 187 | 152 | 339 | 72 | 56 | 128 | 1 | .. | 1 | 9 | 8 | 17 |
| Mean Age .. | 43 | 39 | 42 | 41 | 38 | 40 | 18 | .. | 18 | 37 | 31 | 34 |

TABLE IV.—Showing the Probable Causes of Insanity in the Patients admitted during the year ended 23rd September, 1908.

| Number of Instances in which each Cause was Assigned. | | | | | | | | | | | | |
|----------------------------------------------------------------------------------|-------------------------------------------------|---------|---------|--------------------|---------|-----------------------------------------------------------------------|--------|---------|---------|--------|--------|----|
| Causes of Insanity. | Admissions { 187 Males, 152 Females, 339 Total. | | | | | No. of Cases— | | | | | Total. | |
| | As Predisposing Cause. | | | As Exciting Cause. | | As Predisposing or Exciting (where these could not be distinguished). | | | Total. | | | |
| | Male. | | Female. | Total. | Male. | Female. | Total. | Male. | Female. | Total. | | |
| | Male. | Female. | Total. | Male. | Female. | Total. | Male. | Female. | Total. | | | |
| Moral— | | | | | | | | | | | | |
| Domestic Trouble (including loss of relatives and friends) | .. | .. | .. | 2 | 10 | 12 | .. | .. | .. | 2 | 10 | 12 |
| Adverse Circumstances (including business anxieties and pecuniary difficulties) | .. | .. | .. | 6 | 3 | 9 | 2 | 1 | 3 | 8 | 4 | 12 |
| Mental Anxiety and Worry (not included under the above two heads), and Over-work | 1 | .. | 1 | 12 | 9 | 21 | 5 | 1 | 6 | 18 | 10 | 28 |
| Religious Excitement | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Love Affairs (including seduction) | .. | .. | .. | 2 | 3 | 5 | .. | .. | .. | 2 | 3 | 5 |
| Fright and Nervous Shock | .. | .. | .. | .. | 12 | 12 | .. | 1 | 1 | .. | 13 | 13 |
| Physical— | | | | | | | | | | | | |
| Intemperance in Drink | 1 | 1 | 2 | 40 | 9 | 49 | 6 | 1 | 7 | 47 | 11 | 58 |
| Intemperance (sexual) | .. | .. | .. | 1 | 2 | 3 | .. | .. | .. | 1 | 2 | 3 |
| Veneral Disease | 5 | .. | 5 | 3 | 1 | 4 | 2 | .. | 2 | 10 | 1 | 11 |
| Self Abuse (sexual) | .. | 1 | 1 | 4 | .. | 4 | 6 | .. | 6 | 10 | 1 | 11 |
| Over Exertion | .. | 1 | 1 | .. | .. | .. | .. | .. | .. | .. | 1 | 1 |
| Sunstroke | 1 | .. | 1 | .. | .. | .. | 1 | .. | 1 | 2 | .. | 2 |
| Accident or Injury | 2 | .. | 2 | 5 | 2 | 7 | 1 | .. | 1 | 8 | .. | 10 |
| Pregnancy | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Parturition and the Puerperal state | .. | .. | .. | .. | 3 | 3 | .. | .. | .. | .. | 3 | 3 |
| Lactation | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Uterine and Ovarian Disorders | .. | 1 | 1 | .. | 3 | 3 | .. | .. | .. | .. | 4 | 4 |
| Puberty | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |

TABLE IV.—Showing the Probable Causes of Insanity in the Patients admitted during the year ended 23rd September, 1905—*continued*.

| Causes of Insanity. | | Number of Instances in which each Cause was Assigned. | | | | | | | | | |
|-----------------------------------------------------------|----|-------------------------------------------------------|---------|--------|-----------------------------------------------------------------------|---------|---------------|--------|---------|--------|--------|
| | | Admissions { | | | | | No. of Cases— | | | | |
| | | 187 Males, 152 Females, 339 Total. | | | | | | | | | |
| As Predisposing Cause. | | As Exciting Cause. | | | As Predisposing or Exciting (where these could not be distinguished). | | | Total. | | | Total. |
| | | Male. | Female. | Total. | Male. | Female. | Total. | Male. | Female. | Total. | |
| Physical— <i>continued</i> . | | | | | | | | | | | |
| Change of Life | .. | .. | 9 | 9 | .. | 4 | 4 | .. | 2 | 2 | 15 |
| Fevers | .. | .. | .. | .. | 2 | .. | 2 | 2 | .. | .. | 2 |
| Privation and Starvation | .. | .. | .. | .. | 3 | 1 | 4 | .. | .. | .. | 4 |
| Old Age | .. | 1 | 1 | 2 | 1 | 3 | 4 | 3 | 2 | 5 | 11 |
| Other Bodily Diseases or Disorders | .. | 2 | 7 | 9 | 16 | 22 | 38 | 6 | 1 | 7 | 54 |
| Previous Attacks | .. | 13 | 13 | 26 | .. | 1 | 1 | .. | .. | .. | 27 |
| Hereditary Influences ascertained (direct and collateral) | .. | 20 | 24 | 44 | .. | .. | .. | .. | .. | .. | 44 |
| Congenital Defect ascertained | .. | .. | 1 | 1 | 3 | 7 | 10 | 5 | .. | 5 | 16 |
| Other ascertained Causes | .. | .. | 2 | 2 | 4 | 4 | 8 | 4 | .. | 4 | 14 |
| Unknown | .. | .. | .. | .. | ? | .. | .. | 35 | 22 | 57 | 57 |
| Total | .. | 46 | 61 | 107 | 104 | 99 | 203 | 76 | 31 | 107 | 417 |
| Deduct for combined causes | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 78 |
| Total Admissions | .. | 46 | 61 | 107 | 104 | 99 | 203 | 76 | 31 | 107 | 339 |

TABLE V.—Showing the Form of Mental Disorder on admission in the Admissions, Recoveries, and Deaths for the year 24th September, 1907, to 23rd September, 1908, inclusive, and the Form of Mental Disorder of the Inmates on 23rd September, 1908.

| Form of Mental Disorder. | Admissions. | | | Recoveries. | | | Deaths. | | | Remaining on Books. | | |
|------------------------------------------------------------------------------------------------------------------------------|-------------|---------|--------|-------------|---------|--------|---------|---------|--------|---------------------|---------|--------|
| | Male. | Female. | Total. | Male. | Female. | Total. | Male. | Female. | Total. | Male. | Female. | Total. |
| <i>I.—Congenital or Infantile Mental Deficiency (Idiocy or Imbecility) occurring as early in life as it can be observed.</i> | | | | | | | | | | | | |
| 1. Intellectual— | | | | | | | | | | | | |
| (a) With Epilepsy .. | 3 | 2 | 5 | .. | 1 | 1 | .. | .. | .. | .. | .. | .. |
| (b) Without Epilepsy .. | 7 | 3 | 10 | .. | 2 | 4 | .. | .. | .. | 2 | .. | 2 |
| 2. Moral .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| <i>II.—Insanity occurring later in Life.</i> | | | | | | | | | | | | |
| 1. Insanity with Epilepsy .. | 11 | 5 | 16 | 5 | .. | 5 | .. | .. | .. | 1 | .. | 1 |
| 2. General Paralysis of the Insane .. | 21 | 5 | 26 | .. | .. | .. | .. | .. | .. | 1 | .. | 1 |
| 3. Insanity of the grosser Brain lesions .. | 3 | 1 | 4 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 4. Acute Delirium (acute Delirious Mania) .. | 1 | .. | 1 | 1 | .. | 1 | .. | .. | .. | .. | .. | .. |
| 5. Confusional Insanity .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 6. Stupor .. | 3 | 2 | 5 | .. | 1 | 1 | 1 | .. | 1 | .. | .. | .. |
| 7. Primary Dementia .. | 12 | 10 | 22 | 5 | 2 | 7 | .. | .. | .. | .. | 1 | 1 |
| 8. Mania— | | | | | | | | | | | | |
| (a) Recent .. | 17 | 23 | 40 | 9 | 9 | 18 | .. | .. | .. | .. | .. | .. |
| (b) Chronic.. | 2 | .. | 2 | 1 | 1 | 2 | .. | .. | .. | .. | .. | .. |
| (c) Recurrent .. | 6 | 6 | 12 | 1 | 3 | 4 | .. | .. | .. | 1 | .. | 1 |
| 9. Melancholia— | | | | | | | | | | | | |
| (a) Recent .. | 30 | 32 | 62 | 14 | 9 | 23 | .. | .. | .. | 2 | 2 | 4 |
| (b) Chronic.. | 2 | 3 | 5 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| (c) Recurrent .. | 6 | 4 | 10 | 2 | 2 | 4 | .. | .. | .. | .. | .. | .. |
| 10. Alternating Insanity .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 11. Delusional Insanity— | | | | | | | | | | | | |
| (a) Systematised .. | 13 | 16 | 29 | 4 | 5 | 9 | .. | .. | .. | 2 | .. | 2 |
| (b) Non-systematised .. | 14 | 14 | 28 | 2 | 6 | 8 | .. | .. | .. | .. | 3 | 3 |

TABLE V.—Showing the Form of Mental Disorder on admission in the Admissions, Recoveries, and Deaths, &c.—*continued*.

| Form of Mental Disorder. | Admissions. | | | Recoveries. | | | Deaths. | | | Remaining on Books. | | |
|---------------------------------------|-------------|---------|--------|-------------|---------|--------|---------|---------|--------|---------------------|---------|--------|
| | Male. | Female. | Total. | Male. | Female. | Total. | Male. | Female. | Total. | Male. | Female. | Total. |
| | | | | | | | | | | | | |
| 12. Volitional Insanity— | | | | | | | | | | | | |
| (a) Impulse .. | 3 | 2 | 5 | 1 | 2 | 3 | .. | .. | .. | .. | .. | .. |
| (b) Obsession .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| (c) Doubt .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 13. Moral Insanity .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 14. Dementia— | | | | | | | | | | | | |
| (a) Senile .. | 7 | 8 | 15 | 2 | 3 | 2 | .. | .. | .. | .. | .. | .. |
| (b) Secondary or Terminal .. | 5 | 2 | 7 | 2 | .. | 2 | .. | .. | .. | .. | .. | .. |
| 15. Neurasthenia .. | 1 | .. | 1 | 1 | .. | 1 | .. | .. | .. | .. | .. | .. |
| 16. Alcoholism .. | 18 | 7 | 25 | 18 | 7 | 25 | .. | .. | .. | .. | .. | .. |
| 17. Toxic Insanity and Marco Mania .. | 1 | 1 | 2 | 1 | .. | 1 | .. | .. | .. | .. | 1 | 1 |
| 18. Hysteria and Hystero-mania .. | .. | 6 | 6 | .. | 6 | 6 | .. | .. | .. | .. | 1 | 1 |
| 19. Amnesia .. | 1 | .. | 1 | 1 | .. | 1 | .. | .. | .. | .. | .. | .. |
| Totals .. | 187 | 152 | 339 | 72 | 56 | 128 | 1 | .. | 1 | 9 | 8 | 17 |

N.B.—The discharge, as recovered, of imbeciles and epileptics may appear an unusually optimistic thing, but in all cases so discharged these patients were so well as to be able to resume their places in society, and to return to the work which they had previously been performing.

TYPHOID IN INSANITY.

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During the years 1907 and 1908, commencing in January of the former, and at a period of long continued heat, dust, and drought, there occurred in the female division of this hospital an outbreak of typhoid fever, during which, at irregular intervals, and generally in single cases or in batches of two or three at a time, eighteen patients and eight nurses were infected, of whom one nurse and four patients died, whilst seven patients recovered, not from the intercurrent disease only, but from their mental disorder as well, either completely, or to a very appreciable extent.

The occurrence of such an epidemic in a community is, in itself, no very remarkable event, but circumstances would seem to indicate the existence of some relationship between the action of the fever and the cure of the insanity in a fairly large proportion (nearly one-half) of those who contracted the disease; if, indeed, we should not be fully warranted in assuming that one was the direct cause of the other.

Although this assumption is no new thing, I venture to hope that in this light my few observations may prove not uninteresting; and, further, that from any discussion that may result, we may gather invaluable crumbs of knowledge from the richer experience of our visiting friends and colleagues.

The origin of this epidemic is obscure, and in some degree problematical, although its restriction to the female division, and to two wards in particular, is significant, notwithstanding the fact that there have occurred from time to time in past years infrequent and solitary cases of typhoid fever amongst the male patients, the last one so recently as April, 1906, but quite typical in character, and presenting no noteworthy feature of any sort.

Resulting investigations have led to the correction of certain supposed defects in drainage and construction, and typhoid has not reappeared since the convalescence of the last patient in April of this year, although a concurrent epidemic at the Idiot Asylum, a separate institution, situated some distance away from the main hospital, has persisted in a desultory manner, and has not yet left us. Here 32 patients of either sex indiscriminately were attacked, together with 6 nurses, of whom 9 patients succumbed to the disease.

It is difficult to trace the association between this outbreak and that at the main hospital, but it may be partly attributed to structural defects and deficiencies, and possibly as a largely contributory cause, the inherently dirty habits of this particular insane type, and the difficulty of diagnosing obscure disease in idiots and imbeciles.

One characteristic throughout the epidemic was the generally atypical nature of the onset and symptoms—many cases more resembling mere enteritis—the Widal test being, perforce, accepted in some as the sole confirmatory evidence. Yet it was deemed wise, for very obvious reasons, that every suspicious case responding to that reaction should be treated as an undoubted typhoid.

As is usual with the insane, the disease was, in most cases, cloaked by the mental condition; detection and diagnosis being rendered doubly difficult by the inability of the patient to complain, or to give information regarding symptoms; so that the majority were discovered only by unremitting

vigilance, and the incessant use of the clinical thermometer. Even then the temperature records were widely diverse, and few afforded the familiar typical typhoid chart.

Amongst the idiot children, the number of indefinite, not to say anomalous, cases was quite unduly large, tubercular and chest disorders much confusing and complicating diagnosis, so that the temperature records, though interesting and curious, were of little practical use.

Constipation in both epidemics, but especially amongst the children, was the general rule, and a further point of interest in connexion with epileptic idiots contracting typhoid was the occurrence of intestinal perforation during an epileptic convulsion in two instances.

We are familiar enough with the influence of many diseases in one direction, *i.e.*, as recognised factors in the production of insanity, which may occur either as a symptom in the early stages, or complicating its course; but notably during the later stages, and in convalescence, especially when there has resulted much debility and exhaustion.

Of these diseases, I believe typhoid fever to be conspicuously prominent, but mental symptoms have been frequently known to complicate also scarlet fever, measles, erysipelas of the head and face, small-pox, ague, pneumonia, and others. Influenza, too, during recent years, has come noticeably and increasingly to the front as a very prolific source of mental disorders.

Has it not happened within the recollection of many of us that patients have been received, duly certified as insane, but actually suffering from nothing else than the "delirium" of typhoid or some other disease? And, again, how frequently in outside practice do we recognise the mental aberration, the enfeeblement and mildly delusional state that more often than any other insanity is the sequel of typhoid fever; the result, probably, amongst other contributing factors, of cerebral anæmia and general malnutrition, consequent on a severe attack, or when convalescence has been unduly protracted, this being particularly noticeable when there exists some inherited neurotic predisposition in young people? Perhaps at this juncture it might be opportune, quite incidentally, to relate that I have met with acute facial erysipelas in a dual rôle, both as the direct cause of an attack of acute delirious mania, and again as the undoubted curative agent in the same form of insanity. In each case, the result was equally rapid, the mental disorder in the one being very quickly produced, and its disappearance in the other quite as speedily consummated.

As scarcely relevant to my subject, I have touched but lightly upon certain diseases as causing insanity, and amongst them I have emphasized typhoid fever, but it is conversely that I wish to exhibit typhoid here, rather as a benefactor in insanity; to demonstrate from actual experience, not what we are all perfectly cognizant of, but the directly opposite, *i.e.*, that that disease does also act as a curative agent; in effect, that an outbreak of typhoid fever in an institution such as this need not be regarded altogether in the light of an unmitigated evil; but that as a set-off against so many chronic and hopelessly insane infected—some fatally—together with all the anxiety and inconvenience incidental to such an epidemic—we are enabled to show on the credit side of the ledger a few cured and discharged as a direct result of the fever attack, and others so decidedly improved in their mental condition as to be apparently well on the way to recovery, most of them deemed hitherto practically incurable. The cases I shall instance are especially interesting, perhaps only so as supporting the theory held during many years past by certain authorities, the late Dr.

Hack Tuke and Dr. Percy Smith, of Bethlem, among them, a theory borne out by experience, *i.e.*, that the mental disorder in insanity is not only modified, but frequently is distinctly improved, if not altogether cured, by an intercurrent attack of typhoid.

Although this can scarcely be taken as exemplifying the influence of the mind over the body, it is, nevertheless, an evidence of the intimate relation existing between the mental and physical health.

Dr. Percy Smith, in the *Journal of Mental Science* for April, 1887, gives cases during an outbreak of typhoid at Bethlem in the years 1885 and 1886, when three recovered, and others who began to improve mentally relapsed into their former mental condition before cure was complete. But he finally remarks that "only those cases which one would have expected to get well under any circumstances did recover," which is far from being our experience at Kew, where this would apply to scarcely one of our cures.

Dr. Hack Tuke, in his *Dictionary of Psychological Medicine*, assists materially with the weight of his own invaluable opinion, and also refers to other authorities long since holding identical views.

Again, Griesinger writes:—"Sometimes the fever" (which, by-the-by, he designates "typhus") "exercises a persistent beneficial influence upon the insanity. (In Schleswig this was observed four times in 49 cases, two being of mania and two of melancholia.)"

But literature on the subject is meagre and unobtainable in the short time at my disposal, so that I must express my regret that I am, in consequence, unable to produce more outside evidence in my own support.

However, the suggestion of the amelioration of insanity by typhoid is plainly no new one, and yet, so far as I have been able to ascertain, there has been no theory adduced by any authority regarding the specific therapeutic action leading to such results.

That the suggestion is amply recognised by those who have had experience of similar epidemics amongst the insane is evidenced by the proposition more than hinted at by several writers to the effect that, at no very distant date, we may see typhoid fever and erysipelas, too, introduced by inoculation or otherwise, as a curative measure in the treatment of insanity.

When medical officer of the Hants County Asylum, as far back as in the early eighties, I had the opportunity of observing, on a small scale, this beneficent influence of typhoid fever, on the mental affection of some patients there, and it has been highly interesting, even if it be only as a coincidence, to find the immature conclusions, then formed by me, sufficiently verified by precisely similar experiences during the Kew epidemic.

The explanation of this theory is at present wrapped in obscurity, but in whatever direction this beneficial influence is exerted, and no matter in what form its action may one day come to be accepted by us, we cannot ignore one very obvious, and already recognised element in the matter and that is the special and individualized care and attention bestowed upon these patients from the onset of the disease.

Our fever patients at Kew, with the exception of the nurses affected, who were immediately removed to general hospitals, were nursed by trained hospital nurses, in especially constructed isolation tents—practically in the open air, apart from all asylum surroundings—and it was found that this continued rest in bed—which rest, be it remembered, is mental, no less than physical, in itself is a therapeutic measure whose influence for good was immediately manifest, even in the worst mental cases, and which, even if resented at first, became very speedily grateful to the prostrated and enervated sufferer.

In almost every instance the mental symptoms quickly subsided, or became obscured by those of the fever—the excitement of mania, when present, becoming merged into and indistinguishable from delirium, and when no permanent improvement ensued, again replacing it; but in the examples I am giving the alteration for the better, in the mental state, was manifested very early in the disease, and almost invariably progressed uninterruptedly to convalescence.

In the two imbeciles, included amongst my cases of partial recovery, it would seem scarcely feasible to attribute their marked improvement, both mental and physical, during, and subsequent to, their illness to any other cause than the nursing. In their degenerate and undeveloped brains it is improbable that any considerable physiological or pathological alteration could have been established that would be accepted as explanatory.

We know that with sane people it not infrequently happens that the subject of an attack of uncomplicated typhoid emerges from it in far better health than formerly. Nutritional changes have been set up during the course of the disease that have led to improved blood condition, and he seems in every way an altered being.

Some occult agency has been at work, but what? With the insane this equally applies, although with them it is highly probable that this same enforced rest and quietude of mind and body, during so extended a period, is more conducive than aught else towards a return to normal conditions of nutrition, and a readjustment of that healthy balance between assimilation and waste that alone can assure the all-desirable *Mens sana in corpore sano*.

Should we not infer that processes of so vital a nature have been set in action by the typhoid infection as may lead to the restoration of a normal blood condition incompatible with the existence of certain foreign elements hitherto perpetuating the insanity?

This can be the more readily believed where the mental disorder may be considered in the light of a toxæmia, an “auto-intoxication,” such as is more than probable in chronic insanities with objectionable habits, pernicious appetites, and general functional interruption and incompetency; also where the bodily condition has become impoverished by prolonged excitement as well. These are precisely the types that seem to benefit most by an intercurrent typhoid, provided there be not too great a degree of secondary dementia—and in these the most good may reasonably be expected to eventuate under the more favorable surroundings, and improved hygiene obtaining in this individualized open air treatment, as compared with the crowded wards from which they mostly come.

It is as the outcome of the satisfactory and encouraging results from this system during the typhoid epidemic, that similar and increased accommodation has been provided for the treatment of acute mental and other cases suitable for tent life, and has also been extended to the male portion of the institution.

CASE I.

E.E.G., aet. 32, married, received 1/3/05, secondary dementia. Previously detained for a few months in 1903, in a condition of agitated melancholia. Cause of first attack unknown, unless associated with functional irregularities.

Present or second attack, mental enfeeblement considerable, and steadily increasing; incoherent and unable to converse; lost to surroundings, and unable to recognise people, even her husband at last; habits became dirty and indecent.

Menstrual irregularity for a time, but afterwards function restored. Physical condition fairly good, but her former good looks, which were considerable, mostly disappeared. She aged and withered visibly; unstable, and frequently maniacal, spiteful, and mischievous, noisy and excited incessantly, attacking those about her, and sleepless at night. Regarded as a hopeless case.

Contracted typhoid, 30/11/07. T. deg. 102.8 deg. 103.8. deg. during the first two weeks, with regular morning fall; thence a regular declining course, with but one slight rise five weeks later. A few rose spots—some diarrhoea, several times profuse, but not excessive. No other symptoms, and no complications.

Mental improvement dated from being put to bed, when she became immediately quiescent and placid—with eyes closed, and perfectly tractable. At the end of the first week she began to be rational, and very quickly regained her lost mental faculties in their entirety, and without a relapse. She made a good recovery, physical and mental, and left on probation, 4/2/08. All her original attractive appearance and personality had been restored—she was intellectually bright, and, according to her husband's statement, only recently, this month (September, 1908), "quite her old self." She has no recollection of her detention in the institution. Since discharged, and doing remarkably well.

CASE II.

M. McC., aet. 28, single, no occupation, home life. Received 14/8/07. Acute delirious mania. Duration of illness, three months. Cause unknown.

Intense excitement and delirium speedily reduced by hypodermic of hyoscin hydrobromate—but mentally remaining unstable and excitable—noisy, violent, and maniacal.

Physical appearance and condition deteriorated and coarsened, prognosis unfavourable—recovery apparently remote.

Contracted typhoid, 2/11/07. T. deg., at first, 105 deg.—remaining high until the end of the ninth week—thence declining, with one exacerbation of 103 deg. a fortnight later. After another week of high temperatures steadily coming down, until convalescent in middle of February, 1908. Recovery hindered by periosteal trouble in sternum—much wasting and debility. Diarrhoea very profuse throughout.

Mental Improvement.—There was, at first, some restlessness and excitement, which quickly yielded to the typhoid torpor and inertia. She became rational suddenly, on November 25th, and remained so without relapse.

Went out on probation, 30/4/08, apparently quite well mentally, and in good physical health and condition. Discharged, 12/10/08, very well, bright, and in robust health.

CASE III.

B.S., aet. 38, single, domestic service. Received, 19/12/06. Profound stupor. Duration of illness, one week prior to admission. A recurrent case; in Kew previously. Of irregular habits, and was brought to Kew from the Abbotsford Convent. Cause of attack unknown.

Utterly lost to surroundings, and attention entirely absent; required to have everything done for her; passively resistive. After a few weeks she brightened up, and was working for a time in the laundry, but only spasmodically, and became unreliable. At times refractory, noisy, and violent; not considered a hopeful case; was sullen, defiant, and enfeebled.

Contracted typhoid, 10/2/07. Temp. long remained very high; little diarrhœa, but a good deal of abdominal complication, and several serious relapses. She became exceedingly debilitated and wasted; thrombosis of left leg, and subsequent periosteal trouble in both tibiæ.

Mental improvement almost coincident with being kept in bed, and maintained without relapse.

Convalescence unduly prolonged; mental condition improving throughout; quiet, tractable, rational, and brighter intellectually than formerly. Very grateful.

Convalescent, 4/4/07, but not well for some months later. Out on probation, 15/1/08. Since discharged.

CASE IV.

A.F.H., æt. 26, single, no occupation; living at home. Weak-minded from childhood. Received, 26/1/07. Acute or recent mania. In Kew previously for a few months in 1904. Noisy, incoherent, sleepless; unable to do anything, and quite lost to her surroundings. Gradually became quieter, but otherwise quite unimproved mentally, and her prospects of recovery seemed remote. Mother in Yarra Bend, and father in Kew at one time.

Typhoid, 26/11/07. A mild typical and uncomplicated attack. Much diarrhœa. T. deg. never very high—only one morning rise to 103 deg. after four weeks' illness—thenceforth subsiding to normal.

Mental Improvement.—Quiet and tractable, under treatment from the commencement, and becoming sensible very speedily. Clear and rational, 16/12/07. On trial leave, 12/2/08, apparently well, mentally and physically. Since discharged.

CASE V.

K.A.H., æt. 36, married. Received, 25/7/06. Acute mania. In Kew previously, in 1899. No known cause for present attack.

Noisy and excitable, obscene and objectionable in habits, delusional, incoherent, and quite lost to surroundings. Remained without marked mental improvement; maniacal; destructive, and actively suicidal; a special case. Always noisy and excited, and dangerous to others. Seemingly a hopeless case—recovery, at best, remote.

Contracted typhoid, 27/2/07. Much diarrhœa and high fever, complicated with pleurisy and pneumonia, at the end of the first week.

Mental improvement, early manifest. Was at once quiet and tractable under treatment, and in three weeks was becoming rational. Marked intellectual improvement at the end of the first month, and restored to normal mental condition, as well as physically convalescent, on 3/4/07. Out on probation, 27/4/07.

CASE VI.

A.T., æt. 28, single, domestic servant. Received, 19/3/05. Recurrent mania. Two previous attacks; excited, restless, noisy, and talkative; inclined to be violent, and dangerous to others; believed to be suicidal; at times melancholic. A fairly typical example of "folie circulaire." Intervals of comparative reason and quiet, but very unstable, and never remaining well for long. Not a hopeful case, as regards the prospects of cure or of discharge.

Contracted typhoid fever, 16/9/07. Very "a-typical" and uneventful. T deg. never reaching 100 deg.; little or no diarrhœa. Widal reaction positive. A little languid and prostrate, but convalescent within a month.

Mental Improvement.—Immediate, and without relapse. Since discharged to her friends. Mental condition better than ever before, and is in very good physical health. Has remained well up to the present time.

CASE VII.

C.R., æt. 32, single, domestic servant. Received, 20/6/06. Recent mania; first attack; noisy and excited, with sexual delusions; considerable enfeeblement, and with faulty habits. Remained without improvement, becoming more demented and incoherent. Habits, dirty; requiring tube-feeding for months together. No improvement in her mental condition up to the date of her contracting typhoid, on 16/9/07. T. deg., at first, 100.4 deg.; in the third week running up to 102 deg., and, during the fourth and fifth weeks, up to 103 deg. Thence gradually declining towards convalescence at the end of October. Some diarrhœa at the time fever was highest; no complications; little weakness or prostration. Made a good recovery.

Mental Improvement.—When first laid up was restless, and inclined to be talkative in a muttering, incoherent way, but otherwise was perfectly quiet and tractable; becoming rational early in October, and not relapsing. Mental recovery coincident with the convalescence from typhoid. Out on probation, 18/12/07; apparently quite well.

CASE VIII.

R.R., æt. 30, governess. Received, 8/5/07. Recurrent mania; previously in Kew, in 1905. Much confusion and enfeeblement; excited and restless; neurasthenic and phthisical. Mentally, remained without improvement; her habits becoming faulty, and here dementia more marked until she contracted typhoid, 15/10/07. Died of collapse, after repeated hæmorrhages, 15/11/07.

Mental improvement was exhibited on several occasions prior to her death, and she conversed so rationally, at times, that it is probable, had she lived, she would have been added to our list of cures.

IDIOT ASYLUM EPIDEMIC.

CASE I.

J.F., æt. 13. Received, 19/4/07. A congenital imbecile (a brother in the same institution). Poorly developed, physically and mentally, and microcephalic; poor intelligence; dull, and unable to converse or answer questions.

Contracted typhoid, 23/6/07; also brother, at same time, who shortly died. Rose spots; high T. deg.; some diarrhœa, and, in that, differing from most of the other idiot patients. Convalesced, 6/9/07.

Mental improvement was very marked during her illness, and subsequently. She became bright and comparatively intellectual, able to converse and to answer rationally, and she is now working in the laundry. Physically, she has also developed into a sturdy, well-grown girl, quite equal to her age.

CASE II.

A.B., æt. 14. Received, 4/9/05. A congenital imbecile; Mongolian type, and inclined to be microcephalic. Poorly developed, physically; a certain amount of intelligence, and mischievous cunning; an inveterate escapee, and inclined to indecently expose herself.

Contracted typhoid 5/6/08. A very mild and atypical case; some spots, and T. deg. 102 deg., but quickly subsiding. No diarrhœa; no prostration or debility. Duration of attack very short, but kept under observation the full 100 days in the isolation tent, at the main building. Here she developed, both physically and mentally, during her illness. Of course, she can never be other than imbecile, but she is altogether more tractable and sensible, and is being trained into a very useful little ward help, and, moreover, takes an interest and a pride in her work.

In this paper I claim nothing very new and original, or, indeed, remarkable by way of scientific discovery. Others, before me, have, from time to time, in years past, drawn the same conclusions, and have given cases illustrative of this influence of typhoid on insanity, seeming examples of direct cause and effect; but in these days of modern laboratory research and deeper insight into the various affinities and antagonisms of the toxins and their anti-bodies in disease—with this further evidence before us the question naturally arises—"Are we justified in tacitly accepting, as a satisfactory solution of the problem, such comparatively inconsiderable factors as have, so far, alone been suggested—whether we ought to credit the mere nursing and hygiene entirely, or should not rather seek for something deeper, some direct relation between the typhoid toxin and that aggravating the mental disorder that might account for the relief or disappearance of the latter?"

The microscope reveals nothing beyond the fact that the addition of typhoid serum, or fresh typhoid blood, to healthy blood, causes agglutination and distortion of the healthy red corpuscles, an agglutination in irregular masses, not in rouleaux, and an alteration in outline from the disc to many varieties of shape. This phenomenon has already been quoted by Wassermann (in "Immune Sera").

Experiments also made by inoculating with typhoid vaccine patients that seemed suitable, because resembling those cured during the epidemic, have so far proved entirely abortive, as was only anticipated by us, for the reason that the circumstances and condition of one prostrated by a virulent dose of active typhoid poison, is scarcely on the same level with that of another in comparatively vigorous, physical health, and inoculated with a modified and harmless serum.

The resulting disturbances would probably always be correspondingly modified, and of little use clinically, while improvement in the mental condition would, perhaps, for the same reason, be indefinitely delayed.

It would, therefore, seem that the one and only way in which definite results are to be obtained is by the direct inoculation of the fever poison in its active and crude entirety, of course, carefully selecting such patients as our recent experiences would point to being most suitable for the experiment, *i.e.*, those whose mental condition seems to offer little hope of eventual recovery under ordinary circumstances; and proceeding cautiously, according to results, either extending our experiments, or discontinuing them altogether.

PROGRESS IN TREATMENT OF EPILEPTIC INSANE.

JOHN STEELL, M.B., B.S.,

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The epileptic is always a difficult subject to deal with, more especially when he has become mentally obscure, and has developed delusions. Roughly speaking, the treatment of the epileptic insane, as of epileptics generally, may be divided into three sections; that is—general, medical, and surgical. I do not propose to touch upon the surgical portion at all, and only in a small degree on the medical. My principal endeavour will be in connexion with the general treatment, and to discuss various forms of employment that have been found beneficial.

The great difficulty in dealing with the epileptic insane is that they are at times practically sane, and can then take part in intricate work of a varied nature, and this period may last for some days, or it may remain for months or years; the patient then having a convulsive seizure or an attack of mental aberration.

To find work of a suitable character for such varying conditions is sometimes extremely difficult, although there is no doubt that work, even of a mental character, if not too complex, does good and apparently exercises a beneficial control on the fits. In the Ballarat Hospital for the Insane, where all the female epileptic insane of the State of Victoria are looked after, it has been found possible to employ a number in various ways.

First of all, laundry work. There the patients employed are of the classes who either have pronounced prodromal or aural symptoms. Most of these are employed in the ironing room under the supervision of the head laundress. Some also are employed in the washing room, but their numbers are necessarily limited on account of the danger of falling into the washing troughs. Still a third section, with one of the assistant laundresses, are employed in hanging clothes on the rails of the drying horses, to be placed in the drying chamber.

Next we come to employment in the sewing room, and here, as the risks are not so great as in the laundry, and there is always more nursing assistance present, the average number employed is always much larger than that at any other work. Besides the laundry and sewing room, many are engaged in household duties in the various wards, and in many cases, during their lucid periods, are often very useful indeed. These are, of course, the patients who could not be trusted at the previous forms of employment, and it is wonderful how pleased some of them are when they find their handiwork of either bed making, burnishing brass door handles, or culinary utensils, appreciated, and what adepts some of them become at their particular duties, forgetting for the time being their imaginary wrongs, and getting rid of their superfluous energy through a normal channel.

Knitting and darning have also been tried, and with good results in some cases; but here again we are faced with an element of danger in the patient falling on the knitting needle. Still, there are some epileptic insane, who, although they will not take up any other form of employment, are quite content to sit away quietly by themselves knitting for hours.

Given cases with marked delusions or hallucinations of sight and hearing good results as regards the work undertaken can be obtained, even

although the mental state may not show any marked improvement; still, the very fact of diverting the patient's mind from her delusions must be beneficial, and in cases tried has given satisfactory results, as the patients did not seem to worry so much about their delusions when so employed.

In connexion with general sewing and dressmaking, some of the patients undoubtedly take a great interest in their daily work, especially the dressmaking, and are pleased to be at it; but some of them much prefer doing fancy work, at which a portion of them are clever experts, evolving and working out pretty patterns. But here, again, a certain element of danger comes in, for frequently the work entails a large quantity of manipulation with scissors, which must for that work, as a rule, be sharp-pointed, and therefore work of this sort can only be availed of in a few select cases. Again, some of those who cannot, or will not, on account of their mental capacity, sew, knit, or do other forms of work, will undertake to do crochet work of various kinds, do it well, and work assiduously at it until the particular article which they are getting ready is finished, and even though they are frequently interrupted, and may possibly have a series of convulsive seizures between the various periods of work. Another form of useful employment is gardening. When a patient who has a marked liking for flowers has been trained in the institution in ornamental gardening, and the different methods of dealing with plants and flowers, the improvement in her general mental state is very noticeable. Not only is she more contented with her general surroundings, but she develops such an interest in her work that, apparently, she has more control over her mental faculties, and, therefore, outbursts of violence are less frequent; and it has also been noticed that the convulsive seizures last for shorter periods, the patient being, as soon as the epileptic seizure is over, anxious to resume her work again. Probably it is needless to remark that the patients so employed use trowels and miniature forks and rakes, not spades or other implements of the usual gardening size, as there might be some danger of them using such as weapons of offence.

It is questionable, also, whether a patient who had a natural talent for art could not be encouraged, in this disease, as in other forms of insanity that I have had under my care, to develop her mental faculty to improving that talent, and concentrate her attention on some complex land or sea scape. The only disadvantage in this form of employment is that of being of such a sedentary nature that the physical condition may become a secondary consideration, and, therefore, exercises have to be arranged in a methodical manner. Possibly this might prove an obstacle to beneficial results, as the patient might resent the compulsion of having to take outdoor exercise in the middle, perhaps, of evolving some highly elaborate scheme for laying out the details of a brilliant work of art.

Unfortunately, I have not been able, as yet, to get any of my epileptic insane patients to take an interest in art, as far as painting is concerned; but I see no reason why it should not be done, and intend to try the experiment with the first suitable case.

So far, I have not been able to test the benefit of music on the epileptic insane; but there can be no doubt that some of them are very fascinated by it, and possibly, if the opportunities were given, would develop into fair musicians, with probably an improvement in the number of their convulsive seizures.

With regard to the Sloyd system so strongly recommended by Dr. Spratling in the treatment of the ordinary epileptic, we have not, so far,

attempted to try it; but, no doubt, given the mental condition of the patient not too far advanced in dementia, it would be possible to teach them that work, and that they would benefit by it. Unfortunately, however, as far as the epileptic insane are concerned, this work could only be allotted to a very select few.

Environment has also, to my mind, a marked beneficial effect on the epileptic insane, on account of their varying mental condition, and especially does this apply to their having pleasing surroundings when employed. To congregate a number of epileptic insane together, with but little to interest them, is not conducive to brightening their lives, and even the small matter of having the ward walls tastefully decorated with bright and pleasing pictures attracts the attention, and keeps the mind from brooding on the present state.

In my opinion, therefore, apart from other treatment, I think that in dealing with the epileptic insane, the environment should be made bright and cheerful. The patients should, as far as possible, be individualized and given every encouragement to direct their thoughts into channels which will lead to their taking up and taking an interest in works of various kinds, even of a complex technical nature, and in some instances requiring a certain amount of originality and careful exercise of studied technique to carry out the details to achieve the desired end.

Dr. Spratling, in his able treatise on epilepsy and its treatment, lays great stress on the point that no more suitable treatment could be adopted for all classes of epileptics, except the epileptic insane, than colony treatment. To my mind, it is doubtful if a modified scheme to that which is in vogue at Craig Colony could not be adopted for the epileptic insane. Say, for instance, that a patient, instead of being able to leave when she pleases, could be prevented from leaving the environment of the institution except under the care of some responsible relative—for, of course, we all know that when the epileptic, be she insane or otherwise, becomes resentful at being detained under control, that is generally the most important time that she ought to be watched, for it generally indicates the advent of an attack of epileptic convulsions or a maniacal attack.

There is no doubt in my mind that work, even in the epileptic insane, has a marked ameliorative effect on the convulsive seizure. This has been deeply impressed on my mind since I took over charge of all the epileptic insane females in the hospitals for the insane in Victoria, now confined in the Hospital for the Insane at Ballarat—over 200 in number.

Of course, in giving work of various kinds, there is no doubt that the abnormal energy evolved in attacks of maniacal excitement flows into channels which are beneficial to the individual, as she can work a lot of it off in a laundry where there are clothes to be scrubbed and ironed.

Obviously, there is much more scope for physical work suitable to men being found than for women; for if we analyze that available for women who have a maniacal tendency, we find that it is narrowed down to laundry work, since sewing-room employment can hardly supply the outlet for the necessary muscular exertion that diverts the maniacal train of thought.

The great difficulty, of course, in dealing with this class of patients is that either before, during, or after, the convulsive seizure, you have a marked mental condition to deal with, and even after this has passed away, there may for some time be a difficulty in the individual taking up the work at which she was formerly employed. The above was well illustrated in the case of a male epileptic under my care, who was for some

years employed in the office of the Ballarat Hospital for Insane. He was a well educated man, and at first he was able to carefully copy documents, write drafts from notes supplied him, and draw out tables for statistics, &c. He was a most careful man, and wrote a beautiful hand. However, as time went on, he gradually deteriorated in his mental capacity. His writing became irregular at first, and ultimately bad, and in the end, on account of his mental state, he had to be removed from the office, and ultimately drifted into a dull apathetic demented state. He suffered while employed in the office from severe attacks of *haut mal*.

In some countries the treatment of epileptics by giving them varieties of employment and teaching them trades has been adopted; but in these cases the mental state is fairly intelligent, and has not up to the time of starting the training altered so far as to dull the intellect and interfere with the reasoning powers.

As to whether work at what one might term the various stages of deterioration of the mental faculties that one sees in a hospital for the epileptic insane does actually any good to the mental condition is questionable; but this much is certain, and I have seen it in several of my cases where young women came to the institution apparently hopelessly insane, who, after a time, under appropriate treatment—general and medical—had their fits held in abeyance. These women have been given certain work to perform, increasing gradually in complexity until they have been employed in the sewing room or laundry; and from that time the fits become less severe, and the patient can ultimately be removed on trial by her friends. Considering the initial mental state, it is difficult to see how the mere fact of employment should assist in so marked a degree the improved mental condition of the patients.

It is hardly necessary for me to state that in all these cases the initial mental state was of the excited or maniacal type.

In this short paper I have included educability to carry out certain complex acts of work as general treatment of the epileptic insane, and, as previously stated, do not propose entering deeply into the various varieties of drug treatment, suffice it to say that my experience of the various drugs tried has been that there are none to come up to the various forms of bromides. In several cases I have tried brometone in five grain doses, and in one case in particular found it acting splendidly; but, unfortunately, the patient died of pneumonia before the anticipated satisfactory results of its use were complete. The case was one of a young married woman of about nineteen years of age, who was pregnant, and the fits very much resembled eclampsia. However, they were ultimately diagnosed as being of true epileptic character.

In another case tried, in which the fits were of a severe nature, 5 gr. doses thrice daily were also given, and these proved of undoubted efficacy. The patient, instead of having severe fits almost daily during the series, had only one or two convulsive seizures in each series. One noticeable fact in connection with this case was that the fits only occurred for about seven days before the menstrual periods, ceasing as soon as the menses were established, and not recurring again until about the same time the ensuing month. The patient was otherwise a healthy young woman, aged about 23 years, and the mental condition, except at the period during the convulsive attacks and immediately afterwards, was not very markedly affected. The mental symptoms after the attacks and after the unconscious state had passed off were usually of a resistive mildly maniacal character.

Of course, we are all aware of the benefit of bromides in the treatment of persons afflicted with epilepsy, and also of their great disadvantages. Personally, I generally combine them with arsenic, but in some instances I use the combination of the four bromides, namely, sodium, potassium, ammonium, and strontium, and find it very beneficial. Where there is a tendency to gastro intestinal irritation the tabloids have given every satisfaction. In some cases where I have given brometone, I have not had any of the bad effects of the bromide preparations generally, and, as far as one has been able to judge, this medicine gave very encouraging results, as the following short history of some cases, in addition to those given above, will show.

Another combination of drugs that I have been trying lately is a combination of the three valenianates (quinine, iron, and zinc). This combination is used in cases where there appeared to be a certain element of hysteria with the epilepsy, and I have so far found what I consider to be a satisfactory result, as the hysterical element has either completely disappeared or become modified; the true epileptic seizure still, however, occurring at intervals.

In conclusion, it appears to me that a great deal can be done by individualizing cases and finding out the bent of the mind of the patient for a particular class of work, and also in selected cases giving a varied series of drugs.

Exhibits.—Picture, d'oley, darned sock, and knitted socks.

DEMENTIA PRÆCOX.

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In choosing this subject, I was chiefly influenced by the fact that dementia præcox, primary dementia, or premature dementia, is a most interesting and, I think, important study, and that the early and correct diagnosis of the condition is most desirable, from its practical utility, alike to the general practitioner, to the alienist, and to the relatives of the patient. Further, however dogmatic my opinion may be on the point, it must be admitted that the recognition of dementia præcox as a complete and distinct disease-entity with a well-defined and characteristic symptomatology is strongly opposed by many authorities, and as vehemently supported by other observers; and, owing to this fact, I hope to be able to interest, or failing that, to rouse genial antagonism sufficiently to induce a discussion by the members of this section.

Kraepelin, who stands pre-eminent as the leading German authority on mental diseases, in 1894 differentiated and grouped as a unity certain well-recognised morbid mental symptoms occurring in adolescence and early adult life under the term—tentatively given—dementia præcox; a designation he selected, as he admits, for want of a better.

The widespread and ever-increasing interest in the subject dates from the publication of his series of clinical lectures on mental diseases, though to an earlier worker—Kahlbaum—is perhaps due the honour of having first recognised and drawn attention to some of the symptoms of this characteristic form of dementia when he described catatonia in 1875, and

contemporaneous with Kahlbaum was Hecker, who described a group of mental symptoms developing about the time of puberty in those with a predisposition to insanity, ending in premature mental decay, and designated hebephrenia.

Clouston, whose reputation is equally as great as Kraepelin's, emphatically denies, however, the existence of such a type of dementia, and maintains that the term (whether we say primary dementia, acute dementia, or dementia præcox) is a misnomer, tending to much confusion, and being an unscientific nosology.

With this adverse opinion, some English and other psychologists are in agreement, notably the late Connolly Norman, C.C., Easterbrook, Robert Jones, and the leading Italian authority, Bianchi, together with some of my colleagues present here to-day.

Since Kraepelin, in 1894, called attention to the unity of a group of mental symptoms or affections occurring in adolescence and early maturity characterized by mental enfeeblement, apathy with diminution or loss of volition, much study has been devoted to this group of symptom-complexes. It has, in fact, received more exhaustive consideration than any other mental disorder during the past eight years. This study will, I venture to predict, result in the universal acceptance of Kraepelin's views. It is only by following carefully the entire course of a disease—its etiology, prognosis, clinical course, and termination—likewise, by according every symptom arising during its course only its due significance, as in the synthetical method of Kraepelin, that any real or definite advance can be made towards the attainment of the truth.

Even now there appears to be every reason to regard the symptomatology of dementia præcox as sufficiently definite to enable one to make as correct a diagnosis of this disease as one does of dementia paralytica.

Kraepelin recognises and describes, with his wonderful attention to detail, three types of dementia præcox—namely, the hebephrenic, the catatonic and the paranoid; however the lines of demarcation between these different forms are not well defined, as the symptoms are found in some instances to be interchangeable. I will refer to the salient features of each form at a later stage of this paper.

As regards the etiology of the disease as a whole, it is found that, though the causation seems often obscure, an hereditary taint, either neurotic, alcoholic, or insane, is perhaps the most potent factor of all causative agents; and, in those predisposed a very moderate degree of mental or physical stress, for example, cerebral or general anæmia, faulty nutrition, loss of sleep, debility following infectious fevers, is sufficient to precipitate an attack of this disease.

It would seem as if the victims of this form of alienation were endowed with cortical nervous of a very limited durability, which are capable of performing their function with apparently fair, or even marked, efficiency for a certain, and, as it were, pre-ordained number of years; and then they run down, or rather, in most instances, the nervous are worn out, leaving their possessors with only enough energy to live the life vegetative. The analogy between premature and senile dementia is, from this point of view, somewhat striking. On the other hand, in dealing with the etiology of dementia præcox, one cannot disregard the opinion expressed by Ford Robertson, who is supported by other investigators, that, as in many other acute and chronic mental disorders, the main causal factor should be ascribed to a gastro-intestinal toxæmia inducing a

chronic degenerative psychosis; for in many, if not all, of these cases, the presence in the blood of streptococci, staphylococci, and diplococci has been demonstrated. These observers describe, in dealing with the pathology of dementia præcox, lesions in the cortical nervous of a degenerative character said to be indicative of auto-intoxication. Such lesions consisting of chromatolysis, pigmentary changes, and atrophy of the nervous of the cortex cerebri, accompanied with an overgrowth of neuroglia and slight vascular thickening. The histological evidence, however, that is submitted by various pathologists in the case of dementia præcox shows so great a want of agreement that to dogmatize on the matter is at present impossible.

Just now, we should remember, there is a tendency to exaggerate the importance of the toxæmic theory of diseases in general to the exclusion (in mental pathology, at all events) of other weighty factors, among which may be instanced the inherited vulnerability or a poor durability of the tissues, likewise the training and environment of the individual. In the disease under notice I have invariably found a faulty heredity of the character to which reference has just been made; sometimes, even, all three conditions (neurotic, alcoholic, and insane taints) are commingled in the one case. To enforce the opinion expressed as to this factor, it may be mentioned that some authors aver that a malign hereditary influence is found in 75 per cent. of the cases of dementia præcox; while Burr, an American writer, states that "only he who is pre-ordained can acquire the disease."

Some attach much importance to masturbation as a cause of this premature mental decay, but rather should it be regarded as only a very frequently present symptom; seeing that, apart from other reasons, dementia præcox attacks both sexes in nearly equal proportions. In one series of observations, embracing 112 cases of this disorder, 57 cases were males and 55 females.

Now it will be agreed, I think, that onanism is less frequent in girls than among boys, and even when practised by the former, the enervating effect is much less pronounced. If masturbation were then a cause of this mental affection, the proportion of males attacked should be much greater than it is.

In the literature on the subject, there is found at present a regrettable want of unanimity as to the age limit of the disease, and herein lies the main difficulty experienced by some alienists in accepting dementia præcox as a disease entity.

Some writers, even Kraepelin himself, describe cases of dementia præcox as occurring at the age of 50 years and upwards. With this view I am not in accord in the slightest degree. The term should, in my opinion, be rigidly restricted to cases first manifesting their early symptoms in adolescence and early maturity, that is, between the ages of 15 and 30 years, though prodromal signs may appear before the age of 15. The terminal stages are found at any age. To my judgment, this psychosis is peculiarly a disease of adolescence, as, in a series of nearly 300 cases, 60 per cent. developed the malady before their twenty-fifth year. The instances that are recorded as having begun after the thirtieth year of life not improbably are cases that have passed unrecognised earlier in their course, or they may be examples of mistaken diagnosis. I fear that, unless the disease is delimited as regards age incidence in the above manner, the confusion that already exists will be aggravated, and will result in another indefinite and unnecessary term being added to our already overburdened

psychological nomenclature; and worse than all, it will assuredly tend to render nugatory Kraepelin's illuminating discovery, epoch-making I firmly believe that discovery to be, quite in the same way, and equally valuable, from the prognostic point of view, as the differentiation of general paralysis of the insane from other forms of dementia by Baile in 1822, was an epoch-making event.

Generally speaking, those attacked by dementia præcox do not exhibit any very pronounced stigmata of degeneracy, but have appeared, on the contrary, prior to the onset, physically and mentally normal.

Before leaving the consideration of etiology, it should be added that as apparently active causal conditions in those predisposed to premature dementia, a term I am inclined to select in preference to dementia præcox, we find sedentary occupations, with absence of open-air exercise, any disorders that induce malnutrition with its resultant anæmia, disorders of the alimentary canal, mental strain, or stress, accompanied with insomnia, infectious diseases, the most potent of which is influenza; then again the puerperal state provides its quota of cases as does also imprisonment.

Before outlining the symptoms presented by each sub-group, and bringing forward illustrative cases, permit me to indicate, however crudely, some of the prominent signs of the disease, taken as a whole.

Dementia præcox is characterized by a definite mental and emotional enfeeblement that is not found in any other mental disorder. These patients are emotionally and mentally dull, while still apperceptive, and able to remember; or to use the more expressive words of Kraepelin, "there is a want of any strong feelings of the impressions of life, with unimpaired ability to understand and remember."

This mental and emotional infirmity is indeed the outstanding feature of the disease, which shows itself by an alteration in the emotional tone and in a dissociation of ideas.

The emotions are dulled and awakened with difficulty, if at all; the patients evince little or no interest in matters that should interest them, while the want of association of ideas manifests itself in irrelevancy or incoherence in conversation, with purposeless acts performed impulsively.

Other symptoms that obtrude themselves early in dementia præcox, especially in the hebephrenic and catatonic forms, are mental lethargy, more or less vague psychic hallucinations of all the special senses. Lugaro has recently pointed out the importance of the presence of pseudo-hallucinations as a diagnostic symptom, especially in the paranoid type. Then again we find mutism, relative or absolute, indicative of negativism; there is great lack of judgment, with not infrequently a suicidal attempt, desperate or otherwise. This last symptom I wish to emphasize, as, of the twelve female cases of dementia præcox admitted to Ararat since July, 1906, seven had attempted suicide; one by cut-throat and fire, some by poison, one by strangulation and precipitation, others by drowning. A prior observation of cases received into Kew Hospital for the Insane led to the same conclusion. My reason for pressing this point is because tradition impresses on us that suicide is the indisputable prerogative of the melancholic. Among my series of male cases of the disorder suicidal attempts were less common. Those patients who have made such attempts, when questioned, can give no definite reason for their action, or if a reason be given, it is usually quite inadequate; and this fact helps one very materially in differentiating dementia præcox from melancholia.

Such suicidal acts are, I believe, impulsive and motiveless, like most of the actions of these demented.

The disease, as a rule, exhibits an insidious onset, and for the recognition of its earliest manifestations an intimate knowledge of the individual, the personal and family history, is very important.

The victims, and I say victims advisedly, of this disease, from which should be excluded the high-grade imbeciles and congenitally deficient individuals, showing various stigmata of degeneracy, may have given every promise of a normal mental development up to a certain, but varying period, and who may have been apt, cheerful and intelligent, full of the joy of life. Then, gradually, and often unperceived by the relatives, a change occurs in the emotional character, and the afflicted become petulant, irritable, perverse, cruel, slothful, and sulky, untruthful, full of morbid ideas and fancies, or obsessions, indolent, moody, careless, and untidy in appearance, rude and unsociable, showing an utter indifference to their relatives, if not an unreasoning and unreasonable dislike. There may also be observed in the early stages a morbid egotism, visionary scheming, and insane ideals, loss of balance, lack of judgment, eroticism in thought or deed. One of my patients suffering from this disorder even accused both her father and her sweetheart of having had sexual intercourse with her, but on examination the girl was found to have an intact and fragile hymen.

These patients are very prone to have causeless emotional storms suggestive of hysteria, but distinguished from it, during which acts of impulsive violence, destructiveness, suicide, or infamous accusations may be indulged in; and any repentance they may express after the act is insincere.

The recognition of such a change in the emotional life of an adolescent as is here indicated should give cause for much concern.

In this connexion, I would like to observe in passing that many of the cases one sees reported in the press, where young girls have made criminal accusations against a male assailant, known or unknown, would prove, on strict investigation, to emanate from, and have their sole foundation in, the disordered emotions of a premature dement.

As further symptoms of the disease, when fully established, may be mentioned the occurrence of insane ideas, stupid, silly, and grotesque, as distinguished from delusions; and the content of these ideas, and the manner in which they are apathetically expressed by the patient, serve to indicate the want of connected thought and dull emotional tone so characteristic of this malady.

Frequently, also hypochondriacal ideas of various kinds are found, vague hallucinations are often present, sometimes delusions of unseen agency are met with, the patients asserting that they are being subjected to electric shocks, or are being acted on by spiritualistic forces, or, again, can send and receive messages by wireless telegraphy, by telepathy, and by non-existent telephones.

Although the tenor of the hallucinations and delusions may be of an apparently painful character, yet these patients rarely exhibit any trace of the distress or anguish that is so characteristic in the melancholic.

There is loss of vaso-motor tone, with cyanosis of the extremities; the pupils are sluggish in their reactions, and are usually dilated; the knee-jerks are exaggerated; while the muscular tone is generally lowered. The blood-pressure is invariably below normal; while in melancholia, on the other hand, the blood-pressure is raised.

Some authors maintain that mental confusion is a prominent and early symptom of dementia præcox, but rather is it found that the attitude is not so much one of confusion as mental lethargy; for these patients are usually quite conscious of, and appreciate what is said to them, and are

alive to their surroundings, though in a furtive manner often, but they are unresponsive. The morbid process, whatever be its nature, affects to a much greater degree the executive faculties than it does the perceptive; and, though it produces varying clinical pictures, for example, in one individual the personality becomes transformed, but with little disintegration, with the resultant paranoid form; while in another the personality may be dissociated or disintegrated, producing the hebephrenic and catatonic types, which latter two forms are closely allied clinically—these three varieties must not, however, be regarded as different diseases, but merely as the components of the one disease—*dementia præcox*. Sérieux, the French observer, defines *dementia præcox* as a disease essentially characterized by a special and progressive psychical enfeeblement, supervening during adolescence, and culminating, as a rule, in the disappearance of all manifestation of mental activity, without ever compromising the life of the subject.

We have in this disorder a marked weakness of the mental images experienced by the patient, and this fact strikes the keynote of the disease, and also explains the want of emotional tone, the loss of volition or mental and physical anergia, the difficulty of fixing the attention and of associating ideas. To summarize the symptomatology of *dementia præcox*, we find psychical enfeeblement, but with ability to comprehend and memorize, diminution or loss of emotional tone, feebleness or lack of judgment, various hallucinations and negativism, as exemplified in mutism and resistiveness, apathy, stupor, or anergia, mental and physical—a failure of every impulse to occupation. Impulsive acts of a motiveless character directed against themselves or others, insane ideas and vague grotesque fancies with, at times, delusions. There is want of effective feeling stereotyped actions, puerility, motor-excitement, verbigeration, they answer in monosyllables, if at all, masturbation is frequently practised. They are dull and listless, with expressionless features creased at times by a causeless inane smile. And, lastly, let us remember that the age-incidence of the psychosis is from the fifteenth to the thirtieth year in those with a faulty heredity. The disease most frequently, in early maturity, manifests itself at first by a state of pseudo-depression, accompanied with hallucinations or vague confused delusions, or by an outburst of psycho-motor excitement, which is essentially different from an attack of acute mania.

As to the diagnosis of this form of alienation, experience has firmly convinced me that the great majority of the acquired psychosis occurring in adolescence and early maturity belong to one or other type of premature dementia. That there are found cases of simple melancholia and pure mania developing at that period of life must be admitted, but their occurrence is much less frequent than is generally supposed; in fact, I would go so far as to assert that pure melancholia and mania are distinctly rare between the ages of fifteen and thirty years. This is a point on which I desire to lay strong emphasis, with a view to impressing on the general practitioner the importance, especially from the stand-point of prognosis, of a correct diagnosis in cases of insanity setting in during adolescence and early maturity.

The records of Ararat Asylum for the past two years and three months show that, of the 40 male patients admitted between the ages of eighteen and thirty, none suffered from melancholia, while one presented symptoms of mania; and of the 25 females admitted during the same period at

the corresponding ages, none were examples of mania or true melancholia. In my opinion, out of the total 65 cases, 36 suffered from premature dementia.

A reference to the symptoms of dementia præcox just enumerated will indicate the signs by which this disease may be recognised; but, owing to the slight acquaintance the general practitioner seems to have with this form of dementia, it may not be inadvisable to draw attention to some of those signs which serve to differentiate this mental disorder from melancholia, mania, hysteria, neurasthenia, and acute sensory delirium. From imbecility, epileptic dementia, and degeneracy, the most cursory examination should separate dementia præcox without difficulty.

In considering the differential diagnosis, prominence will be given to those symptoms chiefly which, in the selected disorders, are directly antithetic to the characteristics of dementia præcox.

The manifestations of neurasthenia are, of course, legion, but to discriminate it from dementia præcox let us regard the constant mild but real depression often accompanied with hypochondriasis and the self-centred feelings of the neurasthenic. Again, such patients are irritable, morbid, and querulous, are subject to imperative ideas; they show exaggerated emotionality, and make complaint of various phobias, their constant headaches, and often intractable insomnia, and, lastly, the cardiac and gastro-intestinal phenomena are the main symptoms serving to distinguish the two maladies.

To aid in deciding between dementia præcox and hysteria, if attention be directed to some of the more prominent components of the kaleidoscopic clinical picture of this latter neurosis, we find a morbid and intense reaction to emotion and suggestion, resulting in histrionic display and in the simulation of various paralyses and contractures; in dementia præcox, on the other hand, the emotions are hard to rouse; there is little or no response to suggestion, rather do we see negativism.

Then, again, in hysteria we observe the convulsive crises, the amnesias, the varying sensory disturbances leading to local anæsthesias and hyperæsthesias, the morbid nervousness and capriciousness, the pronounced desire they show for sympathy and consideration from those around; such are symptoms that one never sees in dementia præcox. The contrast in the emotional tones of the two disorders should remove any doubt from the mind of the clinician.

It is perhaps necessary to indicate some points in the differential diagnosis between acute mania and that form of dementia præcox called catatonic excitement, as in the early stage some difficulty may be experienced. As I have remarked, pure mania is of comparatively rare occurrence, and the greater number of cases described or designated as mania by writers of the more or less remote past belong, in my opinion, to other forms of mental disorder. It is not improbable that most of those cases which are grouped under the term adolescent mania would, on careful study, prove to be but a symptom-complex of dementia præcox of the catatonic form, or examples of acute sensory delirium. In mania, the motor-restlessness is more intense and continuous and brisk than we find in the catatonic excitement of dementia præcox, where it is spasmodic, aimless, motiveless, and absurd. Again, in mania the actions are to a certain extent comprehensible, more or less purposive, and produced usually as the result of stimuli; the reverse is the case in dementia præcox. Then, again the rapid flight of ideas with constant flow of language, the exaltation of the ego, the vivacity and gaiety, the divertibility and facility so

characteristic of the maniacal patient, find their direct antitheses in dementia præcox; here there is an utter dearth and dissociation of ideas, shown by the stupid repetition of the same words and phrases, and their answers to questions, even when given, are disconnected and stupid. The emotional tone in mania is quickened, it easily and appropriately responds to external or internal stimulation; whereas in dementia præcox the emotional tone is blunted and dull, and difficult to rouse, and, even when roused, the response is generally incongruous and silly. The sleeplessness in mania is much more pronounced than is found in dementia præcox, there being little or no need for hypnotics in the latter disorder; lastly, as a further aid in deciding between the two conditions, we have the insidious onset in dementia præcox, as contrasted with the sudden development of the symptoms in cases of acute mania.

There is also another psychosis of the maniacal type that resembles somewhat closely dementia præcox, and is frequently confounded with it.

The condition I refer to is called by a bewildering multiplicity of names. The designation I most favour being acute sensory delirium.

The importance of a correct diagnosis being made in these conditions, as in those previously considered, hinges on the question of prognosis, as in acute sensory delirium the outlook is distinctly favorable, assuming that the physical health be maintained; while in dementia præcox the prognosis is invariably of the opposite character.

To differentiate between the two disorders, if we have regard to acute sensory delirium we find that the outstanding features consist of confusion of mind, or clouded consciousness with disordered associative memory, vivid and varying hallucinations, and delusions of an exalted or persecutory character leading to feelings of apprehensiveness or fear; such symptoms do not occur in dementia præcox, where there is little or no confusion of thought, no interference with memory (in the early stages at least), there is clear perception, and feelings of apprehension are not met with. Then, again, in acute sensory delirium another prominent diagnostic sign is found in the great motor restlessness—almost, but not quite, maniacal in its intensity—along with a constant flow of dissociated phrases uttered incoherently in a loud voice, intermingled very frequently with foul and obscene language.

There is not noticed the rapid flow of ideas as in mania, nor the verbigeration so characteristic of the mentally impoverished premature dement.

A trivial but interesting diagnostic point is that the eyes in acute sensory delirium are brighter than the dull, vacant, lack-lustre eye seen in dementia præcox.

As a rule, acute sensory delirium sets in abruptly with vivid hallucinations, not so dementia præcox; and in the former disorder the patients are extremely restless, boisterous, loquacious, destructive, of faulty personal habits, and sleepless, with none of the frequent remissions into placidity seen in the excited catatonic form of dementia præcox.

In acute sensory delirium there is more confusion and a lessened perceptive acumen for sensory impressions than is found in dementia præcox, and while the emotions are keen and responsive in the former, yet the nature of the stimuli is misinterpreted, thus giving rise to the characteristic hallucinations, illusions and delusions of that disorder, and which are absent from the picture of dementia præcox.

The duration of acute sensory delirium is usually from three to six months, and recovery ensues; in dementia præcox, on the contrary,

recovery, even in the wide sense of the term, never occurs; though it occasionally happens that such patients may, if blessed with relatives retaining sufficient interest in them, leave the asylum on extended probation as permanent mental cripples.

Now we have left for consideration the differential diagnosis between simple melancholia and dementia præcox, when the latter manifests itself in the hebephrenic and catatonic stuporous forms.

Simple melancholia, which, though of more frequent occurrence than pure mania, is still a comparatively rare psychosis between the ages of 15 and 30 years, may be distinguished from primary dementia by the recognition of the apprehensive feelings accompanying the intense depression, the terrifying hallucinations, the self-accusations, the delusions of sin and unworthiness, the introspection and psychical pain so characteristic of the melancholic, and the entire absence of such a symptomatology in dementia præcox.

In melancholia the blood pressure is raised, and the pupils, as a rule, are contracted, while in dementia præcox the opposite conditions prevail.

The melancholic patient will generally converse at some length about his anguished feelings and sensations in the most self-pitying and hopeless tone. The premature dement, however, experiences none of those thoughts, and answers apathetically in monosyllables, if he be not mute, there being not the slightest trace of emotional dejection.

In melancholia we observe none of the stereotyped movements—the verbigeration and negativistic symptoms, the motiveless impulsivity, the mental and physical anergia so constantly seen in dementia præcox, the intense unhappiness of the melancholic, as he sits or stands dejected and hopeless with knitted eyebrows and furrowed brow, exhibiting the characteristic and peculiar tension of features, finds no counterpart in the facies—smooth, vapid and expressionless of the torpid, unemotional premature dement.

I will now endeavour to briefly indicate some of the more characteristic signs of each of the three recognised forms of dementia præcox, and to present notes of a few illustrative cases with photographs. By the courtesy of Dr. Barker, the superintendent of the Hospital for Insane, Kew, I am happily able to bring before you several patients who, in my opinion, are typical examples of this form of alienation.

The commonest and, very frequently, the earliest recognised form of dementia præcox is catatonia, either as catatonic stupor or catatonic excitement, or as an irregularly recurring alternation of the stuporous and excited phases.

The catatonic form manifests itself by the occurrence of a pseudo-depression, though, strictly speaking, it is apathy; the adoption of constrained attitudes (*cerea flexibilitas*); answering very tardily, and in the fewest words possible, or there may be assumed dumbness; a stupid resistance to external influences—an inane, senseless resistiveness, and often refusal to take food, coupled with a depraved appetite. All these symptoms forcibly indicate the prominent feature of the disorder, namely, negativism.

Another sign that Kræpelin emphasizes is stereotypism, exhibited in the senseless repetition of the same movements, or of the same words and phrases.

There is also a characteristic listlessness, apathy and indifference to surroundings. It should not, however, be understood that these patients

are dead to their surroundings, far from it; they do register, to an extent, what transpires around them, and know the names of those around, though they are unresponsive, but to the casual observer they appear to be quite oblivious of everything.

These patients very frequently, in the early stages, have hallucinations, illusions, and vague delusions often of sexual content. They exhibit motiveless impulsiveness, committing acts of causeless violence against themselves, or others, for which when questioned afterwards they can assign no adequate reason. The apathy shown by the patient not infrequently becomes intensified until, either gradually or rapidly, it reaches the condition of catatonic stupor, characterized by physical and mental lethargy—the head hangs down, the body is limp and flexed, the eyes are half closed, the face is utterly expressionless, save for the occasional inane smile that appears, though in some of my cases this vacuous smile or grin is constantly in evidence.

The muscular rigidity is elicited when an attempt is made to flex or extend the patient's limbs or head, such efforts calling forth antagonism in the opposing muscles. The patient is absolutely mute (intentionally dumb), and makes few, if any, voluntary movements, though there may be a senseless rhythmic action of the hands or fingers (stereotypy).

External stimulation causes little or no response. Generally when patients are in this state of catatonic stupor they require to be forcibly fed, to have everything done for them, and it is needless to add that they rarely can be induced to work. This condition of catatonic stupor may last weeks, months, or year. [Dr. Gamble quoted illustrative cases.]

Another phase of catatonia is seen in catatonic excitement of an intensity varying from attacks of impulsive homicide to a mere stupid noisy unrest. Two of the most dangerous female patients—26 and 28 years old respectively—in Ararat Asylum at the present time are suffering from prolonged catatonic excitement; while another woman (now in Kew Hospital for Insane), afflicted similarly, made, when at Ararat, a murderous attack on one of the staff.

Patients suffering from catatonic excitement show more or less motor-restlessness, and perform purposeless acts or movements often of a stereotyped character. They are sometimes impulsively violent and destructive, utterly careless of their personal appearance, and their habits are faulty. They understand what is said to them, but their replies are incoherent and rambling; but during a lull in their excitement a series of relevant answers may be obtained. To argue with or to attempt to mollify them when excited, seems, in most cases, to exacerbate their excitement, and to engender a flood of foul abuse, based on their delusional ideas and fancies, which ideas have, among the female patients, a vivid sexual colouring. In regard to this point, I should add that there is an aggravation of the symptoms in the excited female catatonics at or about the menstrual periods, which periods occur in a regular and normal manner. In the stuporose cases, on the other hand, there is frequently a condition of amenorrhœa.

As a rule, the paroxysm of violence subsides on the act being accomplished, and they settle down without concern as to the consequences. Together with the motor restlessness we generally find periods of longer or shorter duration, when they are noisy, shouting out a torrent of incoherent words or phrases. At times, owing to the narrowed ideation faculty the same words, phrases, and unintelligible jargon are repeated day after day in exactly the same tones.

Cases of catatonic excitement often require tube feeding for lengthy periods, and assiduous attention from the nurse. In some cases the degree of restlessness and noisiness is of a milder character than that indicated above.

The duration of both catatonic stupor and catatonic excitement is very variable, and unless one has had the case under close observation for a considerable time it is impossible to even venture a prediction as to how long either phase will endure—it may be a matter of weeks or years.

The recuperative power of these patients suffering from the excited form of dementia præcox is remarkable, reminding one very much in this respect of folie circulaire.

The next phase of dementia præcox to be considered is the hebephrenic form.

In this the onset is, as a rule, insidious and the condition is characterized by apathy and progressive mental enfeeblement, along with more or less marked negativism, stereotypy, motor unrest, and impulsiveness, though these latter symptoms are not generally so prominent as in the catatonic form.

A change in the affective character and emotional tone is observed, and, in the early stages, the patients are suspicious, self-centred, reclusive, and show an unreasoning mistrust of their relatives. They exhibit little initiative either in action or speech. They are taciturn when not mute. Vague delusional ideas, morbid or fanciful, may be expressed.

Another prominent symptom is their slothfulness. They will stand or loll about in one position for hours at a time, without feeling the slightest incentive to action. They are utterly listless and apathetic. The pathognomonic, expressionless face may be, and often is, wrinkled with a causeless insane grin. It is found that these patients can give sensible answers to the first few questions, but there is a strong tendency for them soon to become irrelevant and incoherent.

There now remains to be outlined the features of the paranoid form of dementia præcox, which is an infrequent, though characteristic, type of the disorder.

Here there is found much less dissociation or disintegration of the personality than occurs in the catatonic and hebephrenic cases, consequently their conversation is coherent and rational, in so far as the conversation of a person dominated by delusional ideas can be regarded as rational. Their logical sequence of thought is very defective, and their remarks show often an extreme want of judgment and absence of appropriate emotion. These two last-named symptoms, taken in conjunction with the chronic, more or less systemized delusions always present, I have come to regard as almost pathognomonic of the disease. Hallucinations, auditory, visual, and other are very often observed accompanying the insane ideas or delusions of a persecutory content or of unseen agency; the patients asserting that they are being annoyed or persecuted by certain persons, or that they are being acted on by hypnotic or clairvoyant influence, by electric shocks, by spiritualism, *et hoc genus omne*.

Hypochondriacal ideas, expressed unemotionally, are frequently present, resulting at times from their insane fancies of being subjected to occult forces; and these ideas lead, in a measure, to their marked disinclination to work and control their actions in other ways. These patients, who exhibit none of the reasoning faculty and acumen of the true paranoiac, are very often querulous, not to say litigious, egotistic, and ostentatious, and take a pride in their personal adornment, and may express ideas of exalted personality and ability.

Many of these cases develop various mannerisms or stereotypes, and often talk in a self-conscious, affected way, using extravagant phraseology.

Again, while some of these patients show a lack of initiative in conversation, others are very garrulous both in speech and in writing; though there is evident a marked limitation of ideation in their verbosity. One of my male patients, suffering from paranoid dementia præcox, wrote 400 personal letters each of considerable length within three months of being certified as insane, and he is still writing. A strong sexual element, as in true paranoia, is often noticeable in this type of the disease, and in the female cases this feature assumes great prominence and forms the pivot round which all their ideas revolve, as is exemplified in the case to be cited of Amelia B—.

The memory for matters that they think about constantly, or, as I might term it, the circumscribed memory, is very acute, as it is in the paranoïæ.

Time precludes my giving the notes of more than one case of paranoid dementia præcox.

No. 7. X., male, *aet.* 21, single, bank clerk; normal mental development—a quiet, reserved, and rather reticent lad.

Sister died insane at twenty-two years of age; father had been confined in an asylum.

No cause assigned. Admitted 20th June, 1908. First attack. Duration of attack on reception, six to eight months.

State before reception, obtained from warrants.—Very talkative and restless; showed great want of balance in conversation. Groundless grievances against father and senior officers in bank. For months his conduct has been erratic. Abusive and threatening towards father, mother, and family generally. Aimless extravagance, always trying to borrow money. Gets into paroxysms of rage when thwarted. Has delusions that his people are against him. Says his father is becoming insane. Writing hundreds of long letters, often of abusive character if his requests for money are not acceded to. He lost his place in the bank through divulging banking secrets. He also drank to excess.

State on reception.—Excited and very loquacious. Some exaltation. There is a tendency to incoherence in his remarks, which mainly have reference to his detention in asylum. He is a good-looking, apparently intelligent lad. Expresses very bitter feelings towards father and a bank official. Has delusions of persecution; says that his being sent to the asylum is a put-up job on the part of his father, the bank official, and the police. Is flippant and patronizing in manner, and has great confidence in his own ability and importance. He exhibits great lack of judgment, and his many schemes for the future are ever-changing and impractical. Physical examination showed no organic defects. The eye reflexes were normal; the knee jerks exaggerated. There were coarse muscular tremors on extension of the hands, and the tongue was tremulous.

Further progress of case.—Became indolent, though he worked occasionally in the garden in a desultory way; constantly making complaint of having rheumatism so as to avoid going to work. Accused father of causing his sister's death. Still vapidly garrulous concerning the injustice of his detention, but his attempts at arguing the *pros* and *cons* of his case are peurile in the extreme. His lack of judgment, his facility and his delusions are very pronounced in the innumerable letters he writes. After eight months he was permitted to leave on probation.

TREATMENT OF STAMMERING, WITH SPECIAL RELATION TO RESPIRATORY EXERCISES.

T. GARNET LEARY, M.D. (Edin.), M.R.C.P., Sandringham.

No one except those who have been afflicted with the misfortune to be a martyr to speech defect realizes the pain, the annoyance, and morbid sensitiveness in trying to give expression to their thoughts without the inconveniences and sympathy that such efforts invoke. In fact, many a youthful career has been blighted on account of such an impediment. Success indirectly is interfered with, not only in failure to gain admission to the public services (army and navy), but from shyness and lack of *esprit de corps* in business, the prospects of attaining the goal of their ambition may be interfered with. Also, many a leaning for a profession or occupation has been misdirected to some other channel which is incompatible with the temperament or individual personality. It is a matter of opinion whether the terms "stammering" and "stuttering" designate the same meaning, as the conditions that influence treatment are practically the same, and their differences quite non-essential as regards prognosis.

"The primary cause of stammering," as studied by Madame Behnke, London, "is want of co-ordination between the breath muscles and vocal muscles, the one or other lags behind. The harmony of the voice mechanism is thereby interrupted, the nerve centres, which govern their movements, spasmodically fail to control them. Exercises designed to re-establish the exact and instantaneous co-ordination of muscles are given. Their continual practice re-acts on the motor nerve centres in a similar way as gymnastics and massage do in certain cases of paralysis."

The etiology of stammering may be roughly determined by analysis of many cases, and those that play a predominating part may be epitomized in—constant associations, mimicry, heredity, constitutional (after severe illness, scarlet fever, whooping cough, &c.). These may be a contributing factor, especially if a neurotic temperament is in the ascendancy, and in an incongruous surrounding. The cause is not local, but purely a disturbance of the nerve centre concerned in speech, hence the lack of harmonious co-operation of respiration, phonation, and articulation is due to a disturbed molecular action.

The respiratory centre comprises inspiratory and expiratory centres, and is situated in the medulla. These have been proved to be distinct from one another, as stimuli influence each separately, and any abrogation of this physical stimulation (irregular breathing) must result in deficient respiratory exchange, and other metabolic changes besides impairment of normal respiratory movements.

It will be readily understood that explosive speech, repetition of syllables, and other difficulties in commencement are due to a spasmodic interruption of stimuli from the nerve centres to the respiratory muscles, *i.e.*, the expiratory centre is not influenced by the stimuli which have affected the inspiratory centre.

Instead of rhythmic flow of language the impediment, when fully developed, is accompanied by improper respiration and vocalization, manifested usually by inability to produce articulate sounds, accompanied by abnormal, mental, and emotional conditions arising from inco-ordination of mental and vocal processes. Grimaces and facial distortion of all kinds and of spasmodic nature may ensue, short of physical fatigue, in the vain

attempt to give utterance to thoughts, and at times may simulate choreiform movements, or convulsions, or various contortions may be seen affecting the whole body.

This type of speech hesitancy may appeal to many as due to lack of intelligence, when in reality the whole situation may be summed up—lack of co-ordinating power. Frequently, this nervousness is not the cause of the stammering, but the result, as evidenced by the marked exaggeration of the difficulty of utterance whenever they are confronted with conditions that arouse excitement, fatigue, or sympathy, or in trying to conceal their misfortune before strangers. Some stammerers start their sentences with painful and rapid repetition of the initial syllable (generally a consonant), with various vasomotor phenomena, *e.g.*, flushing of face and other physiognomic changes, or standing with an open mouth, rolling of the eyes, or a “clicking” noise, &c. These stereotyped efforts, combined with marked facial agitation in connecting syllables into words, indicate probably some indirect nervous storm, as shown by violent and excited physical movements.

An interesting fact of note is that some musicians also show a distinct stammer when playing without the music, and certain chords in the tune require to be played repeatedly, until eventually the tune has to be started again, or the player at the beginning becomes note-stuck. Such a phenomenon (from personal experience) is in marked contrast to the facility with which the instrument can be played when alone; similarly, in speaking, no encumbrance is ever encountered.

Such exhibitions of pronounced spasmodic or convulsive action of the vocal mechanism, combined with marked bodily agitation when various idiosyncrasies prevail, undoubtedly point to lack of, or probably, exaggeration of, nervous control, *e.g.*, biting lips or the tongue, throwing head back, pinching and kicking evolutions, or stamping the floor, or physically inducing fatigue, and frequently the pain in abdomen due to abnormal diaphragmatic breathing, or in a recent case I had under treatment, where the sufferer used to spasmodically “sweep” the dinner table with his arms in his vain efforts to speak.

As the temperament, if taken into account, is somewhat of a nervous and sensitive order, a link might well be established, associating the improper respiration and vocalization with abnormal mental and emotional conditions, and the more pronounced sufferers are in proportion to lack of nervous and physical tranquillity.

Treatment.—It is quite a simple matter to lay down rules and exercises, but it is a different item to get the stammerer to realize their exact nature, and to study conscientiously their orthodox meaning. In fact, unless these methods are entered into with a zest of earnestness and with some pleasure in the determination to conquer their defect, such a task will be fraught with an unsatisfactory result, and their progress will not be sustained. Each case requires careful weight, subjectively and objectively, and the removal of the cause, with other side issues, has to be accurately determined.

State of the health requires careful attention, and especially a general physical examination, with special relation to any nasal sinus, or throat troubles, and, if need be, surgical interference should be demanded.

Hygienic conditions should not be overlooked, *e.g.*, shower baths, well ventilated rooms, fresh air, and plenty of sleep. Outdoor amusements and games *ad lib.* Dietary rules should be advocated, and dyspepsia and constipation guarded against.

Surroundings to a great extent influence success of progress, as it is difficult for a daily *régime* to be systematically maintained amongst old associations and friends, or in a whirl of excitement or dissipation, until the stammerer has cultivated a habit of calmness and self-possession, and thus bring under control the inco-ordination of vocalization and respiration with correction of physical and nervous phenomena. In fact, segregation should be advocated in the more severe forms, and from personal experience the treatment is much enhanced, and offers more encouragement and less resistance. Public school life should be tabooed, and private tuition advocated until the misfortune is fairly well rectified. A diminished supply of breath causes lessening of physical stimulation of respiratory nerve centre, and to counteract this defect respiratory exercises can be looked upon as the open sesame to the ultimate success in the management of the breath in speaking. Such methods should not be entered into lightheartedly, as the *modus operandi* should entail, as a minimum, half an hour twice, or possibly three times daily, and to be kept up for some months. In all, respiratory exercises and vocalization require about three to four hours' daily drill, and control of these muscles should be as complete as in finger movements.

Various exercises—as admirably described and illustrated by Madame Behnke, in “The speaking voice”—are introduced solely to correct proper method of the management of the breath, and thus to strengthen and exercise better control in the various muscles concerned in speaking. Broadly speaking (those interested should refer to Madame Behnke's own description), these procedures are of a two-fold character. The initial exercises are directed towards the maintenance of respiratory control by the production of an even rhythm between inspiration and expiration; next the chest capacity is increased by a system of deep breathing exercises. With these the patient also goes through a graduated series of exercises in vocal sounds. These exercises react on the nerve centres and help to re-establish exact and instantaneous co-ordination of respiratory with vocal muscles. The movements should be slow, rhythmical, and with precision, in contradistinction to the Sadow system. Madame Behnke's X-rays observations amply confirm the importance of these exercises in reinstating co-ordination between breathing and voice muscles. *Pari passu*, with these respiratory gymnastics, vocal gymnastics play a leading part, and are part and parcel of the treatment, but vocalization drill, if used only, will invariably result in failure or relapse, as evidenced by personal experience, and after many years of toil, until Madame Behnke's system was gratefully requisitioned.

Diaphragm drill is *sine qua non* in mastering the economy of breath, and the patient, who is in the recumbent attitude, soon evinces, after his first visit, marked interest in the easy and smooth delivery of the vowels when a hand follows the abdominal movements. The vowels are first articulated in a natural tone, with the mouth widely opened, so that sounds simulate a musical note, then the vowels are exercised in an explosive utterance. A drilling in the rising and falling inflection of each vowel sound, by commencing the sound with an effusive utterance rising to full pitch of the voice, then by beginning with explosive force and gradually sinking to low tone again. Each vowel is then separately articulated in a prolonged natural tone, the idea being to cultivate the economical expenditure of breath during articulation. A firm volume of sound can frequently be maintained after a course of training on any of the vowels for about half a minute on inhalation. Singers

rarely stammer, on account of the exaggeration or emphasis of the vowels at the expense of the consonants. In fact, a difference of 2 to 6 inches gain will be noted in chest measurements, and apparently instead of a badly developed chest and high "clavicular" breathing, there may be recorded by the respirometer a difference in lung capacity from 50 to 150 cubic inches, and a marked normal respiratory movement.

Reading aloud, syllable by syllable, with special emphasis on the vowels (touching the initial consonants lightly with the tip of the tongue), at the rate of 60 to 80 strokes per minute, is a most useful adjunct, and words (including all parts of speech) are all given equal value by prolonging the terminal part into the beginning of the next word, thereby simulating a monotonous "drawl" or lalling. No difficulty is ever met with in speaking if this pitch and monotone prevail, and such means generally help to re-establish the normal use of the speech organs when the natural and unassumed tone can be easily commanded.

Patience and perseverance will be found invaluable assets, and self-confidence will soon be able to overcome the timidity. The reserve and sensitiveness is in direct ratio to the amount of common sense and grit displayed. It is simpler to start with poetry, which produces an agreeable rhythmical sound, *c.g.*, "Toll for the brave," &c., and to keep up the same rhythm throughout. When this rhythm is fully mastered prose, or even newspapers, can be tackled, so that in conversation whenever any trouble arises, this plan can be easily adopted by delivery in a slow, measured, and deliberate manner. The telephone can be handled in a similar way, but at first requires presence of mind and calmness. Sometimes a house telephone, or a speaking tube, will be found advantageous and serviceable, and can be used with impunity. Every opportunity of elocution and singing in public and in private should be encouraged, as confidence is inspired thereby. Also, every encouragement should be given to divert the mind of the sufferers from their unfortunate impediment, and to adapt themselves to circumstances and surroundings.

SOME REMARKS ON FIVE YEARS' OBSERVATION OF FIFTY EPILEPTICS.

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As I have been taking observations on these cases from various points of view, it occurred to me that perhaps some of the results, none of which, I am sorry to say, present any startling features, might be of interest, although they are in many cases conclusions drawn from figures, and subject to all the errors of such deductions when applied to disease.

In doing this, it is, perhaps, as well to call to mind the fact that the type of epileptic patients coming to these hospitals is a most unpromising one for treatment, and if one can get encouraging results with these, the lowest type, the outlook for the better class of epileptics must be still more hopeful. I think this disease, like consumption, is essentially one for hospital treatment. It is not satisfactory treating these cases at their homes, for if there is one thing required in the treatment, it is patience and perseverance, often for a long period of time, measured by years rather than by months; and how often do the friends of the patient treated at home grow discouraged with the results, and rush about from

one doctor to another, until all hope of cure is gone. In addition, it is becoming probable that as knowledge advances, we will have to adopt a specially made food for epileptics, just as we now adopt a special diet for diabetes, and this dieting will be better and more readily carried out in a special institution than it can be at the patient's home, where very often the patient is allowed to eat anything he likes, and where, even if at first any directions the physician may give regarding diet, are carried out, as time goes on, and the patient rebels, he is given way to, with bad results to himself. As regards the institution itself, it is becoming apparent that these cases are best treated in a colony where they can be classified more and more for purposes of treatment.

METHODS AT KENMORE.

At Kenmore we have a ward on the male and one on the female side specially adapted for epileptics. A monthly chart is kept, showing each day the number of fits day and night in every patient. This is useful, as it serves as a guide for treatment, and gives some idea of the progress of the patient. Another sheet is kept, in which the nurse notes down the number of motions daily of each patient, so that a sharp look-out is kept on the condition of their bowels.

On the female side, an additional chart is kept, showing each month the days on which the menstrual periods began, and the number of days they lasted.

The male patients have been encouraged to give up as far as they were able, tobacco.

DIET.

This consists of the usual finely divided food given to guard against choking as far as possible, and the quantity of salt given is reduced, no table salt of any kind being in the epileptic ward. Where we have found epileptics refusing their medicine, we have put a quantity of sodium bromide, equal to about 30 grains, on their plates at dinner-time, and have succeeded in all cases in getting them to take it, thinking they were taking common table salt.

MEDICINAL TREATMENT GIVEN.

Regarding medicinal treatment, the mixture which we find most generally useful here is one containing sodæ bicarb. gr. v., potas. bromid gr. x. tr. aloes ℥ ii. to v., aq. ad. 5 i. three times daily. The aloes can be increased or diminished at will, according to its effect, and I think the fact of it acting on the rectum makes it very useful in these cases. Starting with the gr. x. dose of potas. bromid, we increase it, if necessary, up to 40 grains, three times daily, according to the number of the fits recorded on the chart, and, in my opinion, when the fits are increasing in number, the remedy is not worse than the disease. In one case the fits were reduced from 1,215 per annum to 36. In this case, when taking the large number of fits, she was the picture of deep dementia, apathetic, stuporose, her mouth wide open, with the saliva dribbling from it. The bromides were pushed, the result was she lost her dementia, became quite bright, took up her work in the sewing room, and, in fact, improved so much that her people wished to take her home. Moreover, her weight increased, she gained over 2 stone, and her assimilation was evidently not interfered with. Nor did she develop any sign of bromide intoxication. The patients are weighed here every two months, and so their assimilation is watched. At different times, I have tried most of the other remedies, but I have come

to regard the one mentioned above as the most generally useful, and I believe that more good is got by sticking to one remedy, and pushing it, according to circumstances, than chopping and changing about. The bicarb. of soda is added on the supposition that there is a diminution of the alkalinity of the blood in epileptics. In some cases with marked dyspeptic symptoms, I have thought that the combination of pil. argent nit. gr. $\frac{1}{6}$ t. d.s. with the above mixture, has been of marked service. I have not found any drugs as good as the above.

STATUS EPILEPTICUS.

Regarding status epilepticus, amongst 50 to 60 cases here in five years, it has occurred in only one case, and that owing to a serious intercurrent illness developing which necessitated the stoppage of the bromides for the time being, and here I say that it is distinctly dangerous to discontinue the bromide treatment suddenly in any one case, as this is frequently the determining cause of the onset of status.

The preventive treatment of status depends on keeping the bowels regular, and on pushing the bromides.

Regarding the treatment of status, I have found the following plan useful. Open the mouth in the interval between the convulsions, and with a mouth-gag between the teeth, pass a tube into the stomach, and give the patient through the tube $\bar{\text{5}}$ iii. mag. sulph. You have to be careful that the tube is really in the stomach. At the same time, I give by the tube potas. bromid gr. lx, chloral hydrate gr. xxx., morphine sulphas gr. $\frac{1}{8}$.. tr. opii, deod., miv. , aq. ad. $\bar{\text{5}}$ i. as recommended by Spratling. The patient also has a soap and water enema if there is much distension, with some turpentine added.

In some cases, where there has been a rise of temperature to any height the wet back has been of use, and I have also found it very useful in the epileptiform convulsions of general paralysis. Instead of the dose of medicine before mentioned, which is given by the tube, I have found equally useful the subcutaneous injection of 10 per cent. sodium bromide (as recommended by Spratling). A couple of mustard leaves seems of service in acting on the semi-paralyzed nerve centres, and rousing them.

EMERGENCY PRESCRIPTIONS.

We kept all these emergency prescriptions, most of which are adopted from Spratling, made up in stock, so that one can act at once in these cases, and no time is lost. Regarding the other methods of treatment of status, I will not speak, as the above gives, I think, more satisfactory results.

The old method of treating these cases by enemata of potas. bromid and chloral is too slow, as before enough is absorbed to do any good, the patient is in the deeply stuporose stage, and one should aim to avert the passage from the convulsive into the stuporose stage.

DIAGNOSIS.

The diagnosis of epilepsy must be made personally. In support of this statement, I can quote at least two cases branded with the diagnosis of epilepsy. One had been recorded as having for years taken a very large number of fits. One day, seeing her for the first time in one of these epileptic fits, I tried cold affusion to the head, with the result that she was permanently cured of her epilepsy, and returned to her home. Another similar one was cured by Faradism, and fits no longer occur in her case.

Both these could have been avoided by the seeing of the fit. It may seem superfluous to call attention to these cases.

With these few desultory remarks, I will put before you the general results of the treatment, and as most of these are drawn from statistical tables and figures, they will, I fear, prove uninteresting, and, in some cases, owing to the fullest information not being available, they will be not as reliable as I would like them to be.

In compiling these tables, I do not use the word cure, preferring to speak of arrest where the fits have been absent for two years and upwards, and I have calculated the improvement in percentage reduction.

RESULTS OF TREATMENT.

The first tables A (males) and A1 (females) show the results of the treatment on the fits.

Table A—Males, 32.

| | | | |
|---------------------|-----|-----|--------|
| Arrest ... | ... | ... | 9.4 % |
| Diminished 50-100 % | ... | ... | 28.1 % |
| Diminished 1-50 % | ... | ... | 28.1 % |
| Stationary .. | ... | ... | 15.6 % |
| Increase ... | ... | ... | 18.8 % |

Thus 65.6 per cent. were benefited by treatment.

These figures do not convey much idea to one's mind of the number of fits taken and of the quantitative value of the diminution, and I will therefore enumerate some of the most marked diminutions, giving the number of fits taken annually—

Case A diminished from 56 to 4 annually

| | |
|---------|------------|
| „ B „ „ | 169 „ 36 „ |
| „ C „ „ | 129 „ 36 „ |
| „ D „ „ | 71 „ 6 „ |
| „ E „ „ | 33 „ 1 „ |

These results are surely encouraging when we consider the class of epileptics we have to deal with; but amongst the females I shall be able to quote some more encouraging decreases—

Table A1.—Females under treatment, 22—

| | | | |
|----------------|-----|----------|--------|
| Arrest ... | ... | ... | 9 % |
| Diminution ... | ... | 50-100 % | 54.5 % |
| „ ... | ... | 1-50 % | 18.5 % |
| Stationary ... | ... | ... | 13.5 % |
| Increase ... | ... | ... | 4.5 % |

81 % were thus benefited by treatment.

Amongst these, the following quantitative diminutions are of interest—

Case A reduced from 79 to 2 annually

| | |
|---------------------------|----------------------------------|
| „ B „ „ | 39 „ 3 „ |
| „ C „ „ | 131 „ 29 „ |
| „ D „ „ | 10 „ 0 „ |
| „ E „ „ | 29 „ 0 „ |
| „ F „ „ | 1,215 „ 36 „ |
| „ G „ „ | 1,185 „ 2 „ |
| „ H „ „ | 103 „ 11 „ |
| „ J „ „ | 70 „ 1 „ |
| „ J „ „ | 239 annually to none for 3 years |
| „ K „ „ | 21 „ „ 1½ „ |
| „ L „ „ | 680 „ „ 4½ „ |
| „ M.—No fits for 6 years. | |

EFFECTS OF TREATMENT AND DAILY INCIDENCE OF FITS.

In my next tables—tables B and B₁—I tabulated the fits according as they showed a marked preponderance in either the nocturnal or diurnal type, and in this table I have shown separately some cases which, under treatment, showed a change from one type to the other. By this change I mean, again, that the cases from showing a preponderance in either nocturnal or diurnal fits came to show a preponderance the other way. Table B, males, showed that out of 32 males — sixteen were mainly diurnal, nine were mainly nocturnal, and seven changed their type from nocturnal to diurnal.

| — | Arrest. | Diminution, 50-100 per cent. | Diminution, 1-50 per cent. | Stationary. | Increase. |
|---------------------|-----------|------------------------------------|----------------------------------|-------------|-----------|
| | per cent. | per cent. | per cent. | per cent. | per cent. |
| Diurnal | 12½ | 25 | 37½ | 12½ | 12½ |
| Nocturnal | .. | 44.4 | 22.2 | 22.2 | 11.2 |
| Changing in type .. | 14.3 | 14.3 | 14.3 | 14.3 | 42.8 |

From these figures it appears that the cases whose fits preponderate in the daytime give slightly the better results under treatment, and that a change in type from nocturnal to diurnal does not give such favorable results as either of the others. As the change becomes more and more confirmed, however, may it not be possible that these cases may take on the more favorable prognosis of the diurnal type

Table B₁, females.—Out of the 22 females, fourteen were mainly diurnal, three were mainly nocturnal, two changed in type from diurnal to nocturnal, and three changed in type from nocturnal to diurnal.

The results in these cases were as follow :—

| — | Arrest. | Diminution, 5-100 per cent. | Diminution, 1-50 per cent. | Stationary. | Increase. |
|-----------------------------|-----------|-----------------------------------|----------------------------------|-------------|-----------|
| | per cent. | per cent. | per cent. | per cent. | per cent. |
| Diurnal | 14.3 | 57.2 | 14.3 | 14.2 | .. |
| Nocturnal | .. | 66⅔ | 33⅓ | .. | .. |
| Change Diurnal to Nocturnal | .. | .. | 50 | 50 | .. |
| Change Nocturnal to Diurnal | .. | 66⅔ | .. | .. | 33⅓ |

Here, again, the effect of treatment seemed to be slightly better in the diurnal type, and the change in type from nocturnal to diurnal seems of better omen than a change the reverse way.

EFFECT OF TREATMENT ON WEIGHTS.

The next two tables which are placed before you are constructed to show if the prolonged bromide treatment induced any cachexia, and if it in any way interfered with the processes of assimilation.

The patients have been weighed every two months for some four years, and their weights recorded.

Table C, males.—Out of the 32—sixteen gained weight, — 50 per cent.; seven remained stationary, — 21.7 per cent.; nine lost in weight, but very slightly, — 27.9 per cent.

The correlation of the weight with the result of treatment showed—

| — | Arrest. | Diminution, 50-100 per cent. | Diminution, 1-50 per cent. | Stationary. | Increase. |
|-------------------|-----------|------------------------------------|----------------------------------|-------------|-----------|
| | per cent. | per cent. | per cent. | per cent. | per cent. |
| Gaining weight .. | 6.2 | 25 | 25 | 19.8 | 25 |
| Stationary „ .. | 14.3 | 42.9 | 28.3 | .. | 14.3 |
| Loss of „ .. | 11.1 | 22.2 | 38.3 | 22.2 | 11.1 |

Taking now the females shown in table C₁, we find that out of 22—ten gained in weight, — 46 per cent.; seven remained stationary, — 31.5 per cent.; five lost in weight, — 22.5 per cent.; and on correlating the result of treatment with the weights, we find—

| — | Arrest. | Diminution, 50-100 per cent. | Diminution, 1-50 per cent. | Stationary. | Increase. |
|-------------------|-----------|------------------------------------|----------------------------------|-------------|-----------|
| | per cent. | per cent. | per cent. | per cent. | per cent. |
| Gaining weight .. | 20 | 60 | 10 | .. | 10 |
| Stationary „ .. | .. | 71.5 | 28.5 | .. | .. |
| Loss of „ .. | .. | 20 | 20 | 60 | .. |

On referring to the tables again, we find that 21 males and 18 females showed improvement; of these—

| | Males. Per cent. | Females. Per cent. |
|-----------------------|---------------------|-----------------------|
| Gained weight ... | 42.8 | 50 |
| Stationary weight ... | 28.5 | 39 |
| Lost weight ... | 28.5 | 11 |

Of those males whose fits were stationary in number, 60 per cent. gained and 40 per cent. lost weight.

Of those females whose fits were stationary in number, all lost weight.

Of those males whose fits increased in number, 66 per cent. gained; 17 per cent. lost; and 17 per cent. stationary in weight.

Of those females whose fits increased, the only one thus classified gained in weight.

From these results I think we can fairly say that the treatment does not, in the greater percentage of cases, interfere with assimilation, and also that the gain in weight is not invariably associated with any improvement in the prognosis as regards the effect of treatment, although here and there one finds an enormous gain in weight associated with a great diminution in the number of fits.

Example.—Female fits diminished from 1,215 to 36 annually, and while this was happening she gained 2 stone 6 lbs. in weight.

INFLUENCE OF AGE OF ONSET.

The next two tables—D and D₁—were compiled with the object of showing what influence the period of onset had on the prognosis of the case under treatment.

They worked out as follows:—

Table D—Males.

| — | No. | Arrest. | Diminution, 50-100 per cent. | Diminution, 1-50 per cent. | Stationary. | Increase. |
|---------------|-----|-----------|------------------------------------|----------------------------------|-------------|-----------|
| | | per cent. | per cent. | per cent. | per cent. | per cent. |
| Birth to 3 .. | 5 | .. | 60 | 20 | 20 | .. |
| 3-7 .. | 1 | 100 | .. | .. | .. | .. |
| 7-15 .. | 4 | .. | 25 | 25 | 25 | 25 |
| 15-20 .. | 5 | .. | 20 | 40 | 20 | 20 |
| 20-30 .. | 8 | 12½ | 37½ | 25 | .. | 25 |
| 30-40 .. | 3 | .. | .. | 66⅔ | .. | 33⅓ |
| 40-50 .. | 1 | .. | .. | 100 | .. | .. |
| Unknown .. | 5 | 20 | 20 | .. | 40 | 20 |

From these tables, those cases starting in infancy and between the ages of 20 and 30 appeared to have the best prognosis, followed by the period between 15 and 20.

Table D₁—Females.

| — | No. | Arrest. | Diminution, 50-100 per cent. | Diminution, 1-50 per cent. | Stationary. | Increase. |
|---------------|-----|-----------|------------------------------------|----------------------------------|-------------|-----------|
| | | per cent. | per cent. | per cent. | per cent. | per cent. |
| Birth to 3 .. | 4 | 25 | 50 | .. | 25 | .. |
| 3-7 .. | .. | .. | .. | .. | .. | .. |
| 7-15 .. | 6 | .. | 66⅔ | 16⅔ | 16⅔ | .. |
| 15-20 .. | 1 | .. | 100 | .. | .. | .. |
| 20-30 .. | .. | .. | .. | .. | .. | .. |
| 30-40 .. | 2 | .. | 50 | 50 | .. | .. |
| 40-50 .. | .. | .. | .. | .. | .. | .. |
| Unknown .. | 9 | 11.1 | 44.5 | 22.2 | 11.1 | 11.1 |

Here those cases starting between the ages of 7-15 showed the most favorable results, then those coming on in infancy.

INFLUENCE OF CAUSE OF FITS ON TREATMENT.

The next tables were constructed to show the probable influence of the cause on the effect of treatment:—

Table E—Males.

| — | No. | Arrest. | Diminution, 50-100 per cent. | Diminution, 1-50 per cent. | Stationary. | Increase.] |
|-------------------------|-----|-----------|------------------------------------|----------------------------------|-------------|------------|
| | | per cent. | per cent. | per cent. | per cent. | per cent. |
| Congenital .. | 7 | 28.6 | 42.8 | .. | 14.3 | 14.3 |
| Heredity, similar .. | 2 | .. | .. | .. | 100 | .. |
| Heredity, dissimilar .. | 3 | .. | 33⅓ | 33⅓ | 33⅓ | .. |
| Tobacco .. | 1 | .. | .. | 100 | .. | .. |
| Sunstroke .. | 2 | .. | .. | 100 | .. | .. |
| Injury .. | 4 | .. | 25 | 50 | .. | 25 |
| Drink .. | 4 | .. | 25 | 50 | .. | 25 |
| Fright .. | 2 | 50 | 50 | .. | .. | .. |
| Opium .. | 1 | .. | .. | .. | 100 | .. |
| Unknown .. | 6 | .. | 16⅔ | 16⅔ | 16⅔ | 50 |

Of these, those caused by fright, of congenital origin, injury, drink, dissimilar heredity, in their order presented the most favorable results under treatment.

Table E1—Females.

| — | No. | Arrest. | Diminution, 50-100 per cent. | Diminution, 1-50 per cent. | Stationary. | Increase. |
|-------------------------|-----|------------------|------------------------------------|----------------------------------|-------------|------------------|
| | | per cent. | per cent. | per cent. | per cent. | per cent. |
| Organic | 1 | .. | .. | 100 | .. | .. |
| Heredity, similar .. | 2 | .. | 50 | 50 | .. | .. |
| Heredity, dissimilar .. | 1 | .. | .. | 100 | .. | .. |
| Childbirth | 1 | .. | 100 | .. | .. | .. |
| Fright | 1 | .. | .. | .. | 100 | .. |
| Injury | 2 | .. | 100 | .. | .. | .. |
| Syphilis | 1 | .. | 100 | .. | .. | .. |
| Typhoid | 1 | .. | .. | .. | 100 | .. |
| Alcoholism in parents | 1 | 100 | .. | .. | .. | .. |
| Teething | 1 | .. | 100 | .. | .. | .. |
| Unknown | 6 | 16 $\frac{2}{3}$ | 50 | 16 $\frac{2}{3}$ | .. | 16 $\frac{2}{3}$ |
| Congenital | 4 | .. | 75 | .. | 25 | .. |

This table shows a few under each heading that the only conclusion worth drawing is that, here again, the cases of congenital origin are favorable cases for treatment.

Regarding menstruation and the effect of its occurrence on the number of the fits, the records of the days on which the periods occurred were charted, and the number of fits occurring on those days were recorded. In no case was there any increase of the fits during the actual period, in fact, if anything, the fits were less frequent on those days than on the other days in the month.

INFLUENCE OF SEASONS ON NUMBER OF FITS.

The number of fits were next classified according to the seasons of the year in which they occurred in largest number, in order to see if the incidence of the seasons had any influence on the disease, and in its turn on the treatment:—

Males 30—Table F.

| — | No. | Arrest. | Diminution, 50-100 per cent. | Diminution, 1-50 per cent. | Stationary. | Increase. |
|--------------|-----|-----------|------------------------------------|----------------------------------|-------------|-----------|
| | | per cent. | per cent. | per cent. | per cent. | per cent. |
| Winter | 12 | 8.3 | 8.3 | 58.4 | 25 | .. |
| Autumn | 7 | .. | 57.1 | .. | 14.3 | 28.6 |
| Spring | 7 | .. | 42.9 | 14.3 | .. | 42.8 |
| Summer | 4 | .. | 25 | 25 | 25 | 25 |

Females—Table F1.

| | | | No. | Arrest. | Diminution, 50-100 per cent. | Diminution, 1-50 per cent. | Stationary. | Increase. |
|--------|----|----|-----|-----------|------------------------------------|----------------------------------|------------------|-----------|
| | | | | per cent. | per cent. | per cent. | per cent. | per cent. |
| Winter | .. | .. | 4 | 25 | 50 | 25 | .. | .. |
| Autumn | .. | .. | 7 | .. | 85.8 | 14.2 | .. | .. |
| Spring | .. | .. | 5 | 20 | 20 | 20 | 20 | 20 |
| Summer | .. | .. | 6 | .. | 50 | 16 $\frac{2}{3}$ | 33 $\frac{1}{3}$ | .. |

These tables showed that the greatest incidence of fits was slightly greater in winter and autumn, but the question of which time of the year the patient takes the most fits does not appear to have any material influence on the prognosis of the case.

THE CHLORIDES IN BLOOD SERUM.

The chlorides in the blood serum were estimated in 31 male epileptics, and the results are tabulated in tables G and G1, 2 c.c. of serum was used in each case, and the blood corpuscles were neglected. An attempt was made to see if the percentages of the chlorides in the blood had any bearing on the results of treatment, and also to see if the percentages of the chlorides had any relation to the age of the patient.

| Chlorides. | Arrest. | Diminution, 50-100 per cent. | Diminution, 1-50 per cent. | Stationary. | Increase. |
|------------------------|-----------|------------------------------------|----------------------------------|-------------|-----------|
| | per cent. | per cent. | per cent. | per cent. | per cent. |
| Under .5 per cent. .. | 18.75 | 31.25 | 12.5 | 18.75 | 18.75 |
| Over ,, .. | .. | 26.6 | 46.6 | 13.4 | 13.4 |

Although the percentages of those improving were nearly equal in the cases having a high and low percentage of chlorides, still those with a low percentage showed a better improvement, in that 18 per cent. were arrested, and 31 per cent. showed a high diminution, against 26 per cent. of those with the high percentage of chlorides. There were, however, fewer amongst those with a high percentage of chlorides who did not benefit by treatment than amongst those with a low percentage of chlorides.

The conclusion that one can draw, although it is a doubtful one, is that a low percentage of chlorides in the blood is, if anything, of slightly more favourable import than a high percentage.

The relationship, if any, of the chlorides to the age of the patient, and the bearing on the results of treatment is shown in table G1.

| — | Arrest. | Diminution, 50-100 per cent. | Diminution, 1-50 per cent. | Stationary. | Increase. |
|--------------------------------------|---------|------------------------------------|----------------------------------|-------------|-----------|
| Average age under .5 per cent. .. | 51.3 | 35.4 | 28.5 | 41 | 39 |
| Average age over .5 per cent. .. | .. | 45.6 | 38 | 28 | 27 |

The results here appear quite contradictory in that it shows that a young patient with a high percentage of chlorides is not a favorable subject; but it also appears to show that an old patient, with a low percentage of chlorides, is also not a good subject; and that we must expect the best results in young patients with a low percentage of chlorides, and older patients with a high percentage of chlorides.

I think that the results of the chlorides examination has, therefore, furnished negative results.

THE BLOOD PRESSURE.

The blood pressure was taken with a Riva Rocci instrument at 11 a.m., 3 p.m., 9 p.m., with the patient in the recumbent posture. The investigation did not show that there was anything of note, except this fact:—In many of those patients whose fits were, mainly nocturnal in type and in those taking their fits in the early morning, the blood pressures were higher in the morning than in the afternoon or evening. It is difficult to say what is the significance of this, whether the tendency to have a high pressure in the morning is associated with a tendency to have the fits at night, or whether it is the result of the fits taken at night and the result of toxins circulating in the blood. Nothing can be gleaned as to psychosis from a perusal of the blood pressures. Both the systolic and diastolic pressures were taken, but only the systolic are quoted.

The following cases are of interest:—

(1) This case's blood pressure was higher in the morning than in the afternoon and evening, and he was a case who changed in type from mainly nocturnal to diurnal in type.

(2) This case had the majority of his fits in the early morning just before getting up.

(a) The blood pressure here was higher in the morning than in the evening, and his fits were mainly nocturnal.

(b) The blood pressure here was higher in the evening, and his fits were mainly nocturnal.

(c) The highest readings here were in the morning and evening, and this case was originally mainly nocturnal, but later changed in type and became mainly diurnal.

(d) In this case the highest reading was in the morning, and his fits were principally nocturnal.

(e) This case the same as (d).

(f) This case was mainly nocturnal, but the highest reading was in the afternoon.

- (g) This case was mainly nocturnal, but highest readings were in the morning and afternoon.
 (h) Same as (g).
 (i) Highest reading was in the morning, and fits were mainly nocturnal.
 (j) The reading was lower in the evening than in the afternoon, and fits were mainly nocturnal.

BLOOD PRESSURES IN THE FEMALES.

The blood pressures in the females do not call for any special remark such as the above.

Tables J show the results of treatment according as the fits were of the grand mal type, the petit mal type, or the combined type.

Table J.—Males.

| — | | | Arrest. | Diminution, 50-100 per cent. | Diminution, 1-50 per cent. | Stationary. | Increase. |
|-----------|----|----|-----------|------------------------------------|----------------------------------|-------------|-----------|
| | | | per cent. | per cent. | per cent. | per cent. | per cent. |
| Grand Mal | .. | .. | 12½ | 43¾ | 18¾ | 12½ | 12½ |
| Petit | „ | .. | 11.1 | 22.2 | 33.4 | 11.1 | 22.2 |
| Combined | .. | .. | .. | .. | 42.8 | 28.6 | 28.6 |

Here it will be observed that the results in the combined type were much less favorable than in the case of grand mal or petit mal, whilst the grand mal cases responded to treatment better than the petit mal.

Table J1.—Females.

| — | | | Arrest. | Diminution, 50-100 per cent. | Diminution, 1-50 per cent. | Stationary. | Increase. |
|-----------|----|----|-----------|------------------------------------|----------------------------------|-------------|-----------|
| | | | per cent. | per cent. | per cent. | per cent. | per cent. |
| Grand Mal | .. | .. | 12½ | 43¾ | 18¾ | 18¾ | 6¼ |
| Petit | „ | .. | .. | 75 | 25 | .. | .. |
| Combined | .. | .. | .. | 100 | .. | .. | .. |

Here the combined appeared to show the best results; but as there were only two cases the result is not reliable. The grand mal, taking into consideration the arrests, showed slightly better results than the petit mal cases.

I would like to state that the treatment of epilepsy becomes more favorable the more that one can classify them and individualize in their treatment, medicinal and dietetic; and this can only be done in the most advantageous way in a hospital, and in a hospital devoted specially to the care and treatment of these cases.

TABLE A.—MALES.

TABLE showing Effect of Treatment on the Number of Fits and the Age of Diminution.

| | | | | 10 to 15. | 15 to 20. | 20 to 30. | 30 to 40. | 40 to 50. | 50 to 60. | 60 to 70. | 70 to 80. |
|-------------------------------|----|----|----|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| No fits for 4 years | .. | .. | .. | .. | .. | .. | .. | .. | 1 | 1 | .. |
| „ 3 „ | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| „ 2 „ | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. |
| „ 1 „ | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Diminished over 100 per cent. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| „ 100 „ | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| „ 90-100 „ | .. | .. | .. | .. | .. | .. | 2 | .. | .. | .. | .. |
| „ 80-90 „ | .. | .. | .. | .. | .. | .. | .. | 1 | 1 | .. | .. |
| „ 70-80 „ | .. | .. | .. | .. | .. | 1 | 1 | .. | .. | .. | .. |
| „ 60-70 „ | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| „ 50-60 „ | .. | .. | .. | .. | .. | 1 | 1 | .. | .. | .. | .. |
| „ 40-50 „ | .. | .. | .. | .. | .. | 1 | 1 | .. | .. | .. | .. |
| „ 30-40 „ | .. | .. | .. | .. | .. | 2 | 1 | .. | 1 | .. | .. |
| „ 20-30 „ | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| „ 10-20 „ | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| „ 5-10 „ | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. |
| „ under 5 „ | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. |
| Stationary | .. | .. | .. | .. | 1 | 1 | 1 | 1 | .. | 1 | .. |
| Increase | .. | .. | .. | .. | .. | 2 | 2 | 2 | .. | .. | .. |

TABLE A1.

TABLE showing Effect of Treatment on Number of Fits (Females).

| Age Decades. | | | | 10 to 15. | 15 to 20. | 20 to 30. | 30 to 40. | 40 to 50. | 50 to 60. | 60 to 70. | 70 to 80. | — |
|--------------------|----|----|----|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|----|
| Diminution— | | | | | | | | | | | | |
| No fits 4 years | .. | .. | .. | .. | .. | .. | 2 | .. | .. | .. | .. | 2 |
| „ 3 „ | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| „ 2 „ | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| „ 1 „ | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Over 100 per cent. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | 1 |
| 100 „ | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 90-100 „ | .. | .. | .. | .. | .. | 1 | 2 | 1 | .. | .. | .. | 4 |
| 80-90 „ | .. | .. | .. | .. | .. | .. | 1 | 1 | .. | .. | .. | 2 |
| 70-80 „ | .. | .. | .. | .. | .. | .. | .. | 2 | 1 | .. | .. | 3 |
| 60-70 „ | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | 1 |
| 50-60 „ | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | 1 |
| 40-50 „ | .. | .. | .. | .. | .. | .. | 1 | .. | .. | 1 | .. | 2 |
| 30-40 „ | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | 1 |
| 20-30 „ | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 10-20 „ | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | 1 |
| 5-10 „ | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Under 5 „ | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Stationary | .. | .. | .. | .. | .. | 1 | 1 | 1 | .. | .. | .. | 3 |
| Increase | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | 1 |
| | | | | .. | .. | 2 | 9 | 8 | 1 | 1 | 1 | 22 |

18 out of 22 improved =86 per cent.
 18 of this 19 above 30 years of age now =94 „
 15 out of 19 improved above 50 per cent. =79 „
 Probable cures, 2 out of 22 = 9 „
 Stationary, 3 out of 22 =13.6 „

TABLE B.—MALES.

TABLE showing the Effect, if any, of the Treatment according to whether the Fits were mainly Diurnal or mainly Nocturnal, or whether it caused any change in type.

| — | | | | Mainly Diurnal. | Mainly Nocturnal. | Change Diurnal to Nocturnal. | Change Nocturnal to Diurnal. |
|-------------------------------|----|----|----|--------------------|----------------------|---------------------------------------|---------------------------------------|
| No fits for 4 years | .. | .. | | 2 | .. | .. | .. |
| " 3 " | .. | .. | | .. | .. | .. | .. |
| " 2 " | .. | .. | | .. | .. | .. | 1 |
| " 1 " | .. | .. | | .. | .. | .. | .. |
| Diminished over 100 per cent. | .. | .. | | .. | .. | .. | .. |
| " 100 | .. | .. | | 1 | .. | .. | .. |
| " 90-100 | .. | .. | | 1 | 1 | .. | .. |
| " 80-90 | .. | .. | | 1 | 1 | .. | .. |
| " 70-80 | .. | .. | | 1 | .. | .. | 1 |
| " 60-70 | .. | .. | | .. | .. | .. | .. |
| " 50-60 | .. | .. | | .. | 2 | .. | .. |
| " 40-50 | .. | .. | | 1 | .. | .. | 1 |
| " 30-40 | .. | .. | | 3 | 1 | .. | .. |
| " 20-30 | .. | .. | | 1 | .. | .. | .. |
| " 10-20 | .. | .. | | .. | .. | .. | .. |
| " 5-10 | .. | .. | | 1 | .. | .. | .. |
| " under 5 | .. | .. | | .. | 1 | .. | .. |
| Stationary | .. | .. | .. | 2 | 2 | .. | 1 |
| Increase | .. | .. | .. | 2 | 1 | .. | 3 |

TABLE B1.—FEMALES.

TABLE showing the Effect, if any, of the Treatment according to whether the Fits were mainly Diurnal or mainly Nocturnal, or whether it caused any change in type.

| — | | | | Mainly Diurnal. | Mainly Nocturnal. | Change Diurnal to Nocturnal. | Change Nocturnal to Diurnal. |
|-------------------------------|----|----|----|--------------------|----------------------|---------------------------------------|---------------------------------------|
| No fits for 4 years | .. | .. | | 2 | .. | .. | .. |
| " 3 " | .. | .. | | .. | .. | .. | .. |
| " 2 " | .. | .. | | .. | .. | .. | .. |
| " 1 " | .. | .. | | .. | .. | .. | .. |
| Diminished over 100 per cent. | .. | .. | | .. | 1 | .. | .. |
| " 100 | .. | .. | | .. | .. | .. | .. |
| " 90-100 | .. | .. | | 3 | .. | .. | 1 |
| " 80-90 | .. | .. | | 2 | .. | .. | .. |
| " 70-80 | .. | .. | | 1 | 1 | .. | 1 |
| " 60-70 | .. | .. | | 1 | .. | .. | .. |
| " 50-60 | .. | .. | | 1 | .. | .. | .. |
| " 40-50 | .. | .. | | 1 | 1 | .. | .. |
| " 30-40 | .. | .. | | 1 | .. | .. | .. |
| " 20-30 | .. | .. | | .. | .. | .. | .. |
| " 10-20 | .. | .. | | .. | .. | 1 | .. |
| " 5-10 | .. | .. | | .. | .. | .. | .. |
| " under 5 per cent. | .. | .. | | .. | .. | .. | .. |
| Stationary | .. | .. | .. | 2 | .. | 1 | .. |
| Increase | .. | .. | .. | .. | .. | .. | 1 |

TABLE C.—MALES.

TABLE showing the Effect, if any, of Treatment on the weights of the Male Patients.

| — | | | | Gain in Weight. | Loss in Weight. | Stationary Weight. |
|-------------------------------|----|----|--|-----------------|-----------------|--------------------|
| No fits for 4 years | .. | .. | | 1 | 1 | .. |
| „ 3 „ | .. | .. | | .. | .. | .. |
| „ 2 „ | .. | .. | | .. | .. | 1 |
| „ 1 „ | .. | .. | | .. | .. | .. |
| Diminished over 100 per cent. | .. | .. | | .. | .. | .. |
| „ 100 „ | .. | .. | | 1 | .. | .. |
| „ 90-100 „ | .. | .. | | 1 | 1 | .. |
| „ 80-90 „ | .. | .. | | 1 | .. | 1 |
| „ 70-80 „ | .. | .. | | 1 | 1 | .. |
| „ 60-70 „ | .. | .. | | .. | .. | .. |
| „ 50-60 „ | .. | .. | | .. | .. | 2 |
| „ 40-50 „ | .. | .. | | 1 | 1 | .. |
| „ 30-40 „ | .. | .. | | 2 | 2 | .. |
| „ 20-30 „ | .. | .. | | 1 | .. | .. |
| „ 10-20 „ | .. | .. | | .. | .. | .. |
| „ 5-10 „ | .. | .. | | .. | .. | 1 |
| „ under 5 „ | .. | .. | | .. | .. | 1 |
| Stationary | .. | .. | | 3 | 2 | .. |
| Increase | .. | .. | | 4 | 1 | 1 |

TABLE C1.—FEMALES.

TABLE showing Effect of Treatment on the weight of Female Patients.

| — | | | | Gain in Weight. | Loss in Weight. | Stationary in Weight. |
|-------------------------------|----|----|--|-----------------|-----------------|-----------------------|
| No fits for 4 years | .. | .. | | 2 | .. | .. |
| „ 3 „ | .. | .. | | .. | .. | .. |
| „ 2 „ | .. | .. | | .. | .. | .. |
| „ 1 „ | .. | .. | | .. | .. | .. |
| Diminished over 100 per cent. | .. | .. | | .. | .. | 1 |
| „ 100 „ | .. | .. | | .. | .. | .. |
| „ 90-100 „ | .. | .. | | 2 | 1 | 1 |
| „ 80-90 „ | .. | .. | | 2 | .. | .. |
| „ 70-80 „ | .. | .. | | .. | .. | 3 |
| „ 60-70 „ | .. | .. | | 1 | .. | .. |
| „ 50-60 „ | .. | .. | | 1 | .. | .. |
| „ 40-50 „ | .. | .. | | .. | 1 | 1 |
| „ 30-40 „ | .. | .. | | 1 | .. | .. |
| „ 20-30 „ | .. | .. | | .. | .. | .. |
| „ 10-20 „ | .. | .. | | .. | .. | 1 |
| „ 5-10 „ | .. | .. | | .. | .. | .. |
| „ under 5 „ | .. | .. | | .. | .. | .. |
| Stationary | .. | .. | | .. | 3 | .. |
| Increase | .. | .. | | 1 | .. | .. |

TABLE D.—MALES.

SHOWING the period of onset of the Fits and the apparent results of Treatment.

| — | | | | | Infancy to 3 Years. | 3-7. | 7-15. | 15- 20. | 20- 30. | 30- 40. | 40- 50. | Unknown. |
|-------------------------------|--|--|--|--|---------------------------|------|-------|------------|------------|------------|------------|----------|
| None over 4 years | | | | | .. | 1 | .. | .. | .. | .. | .. | 1 |
| " 3 " " " | | | | | .. | .. | .. | .. | .. | .. | .. | .. |
| " 2 " " " | | | | | .. | .. | .. | .. | 1 | .. | .. | .. |
| " 1 " " " | | | | | .. | .. | .. | .. | .. | .. | .. | .. |
| Diminished over 100 per cent. | | | | | .. | .. | .. | .. | .. | .. | .. | .. |
| " 100 " " " | | | | | 1 | .. | .. | .. | .. | .. | .. | .. |
| " 90-100 " " " | | | | | 1 | .. | .. | 1 | .. | .. | .. | .. |
| " 80-90 " " " | | | | | 1 | .. | .. | .. | 1 | .. | .. | .. |
| " 70-80 " " " | | | | | .. | .. | .. | .. | 1 | .. | .. | 1 |
| " 60-70 " " " | | | | | .. | .. | .. | .. | .. | .. | .. | .. |
| " 50-60 " " " | | | | | .. | .. | 1 | .. | 1 | .. | .. | .. |
| " 40-50 " " " | | | | | .. | .. | 1 | .. | .. | 1 | .. | .. |
| " 30-40 " " " | | | | | 1 | .. | .. | 1 | 1 | .. | 1 | .. |
| " 20-30 " " " | | | | | .. | .. | .. | 1 | .. | .. | .. | .. |
| " 10-20 " " " | | | | | .. | .. | .. | .. | .. | .. | .. | .. |
| " 5-10 " " " | | | | | .. | .. | .. | .. | 1 | .. | .. | .. |
| " under 5 " " " | | | | | .. | .. | .. | .. | .. | 1 | .. | .. |
| Stationary | | | | | 1 | .. | 1 | 1 | .. | .. | .. | 2 |
| Increase | | | | | .. | .. | 1 | 1 | 2 | 1 | .. | 1 |

TABLE D1.—FEMALES.

SHOWING the period of onset of the Fits and the apparent results of Treatment.

| — | | | | | Infancy to 3 Years. | 3-7. | 7-15. | 15- 20. | 20- 30. | 30- 40. | 40- 50. | Unknown. |
|-------------------------------|--|--|--|--|---------------------------|------|-------|------------|------------|------------|------------|----------|
| None over 4 years | | | | | 1 | .. | .. | .. | .. | .. | .. | 1 |
| " 3 " " " | | | | | .. | .. | .. | .. | .. | .. | .. | .. |
| " 2 " " " | | | | | .. | .. | .. | .. | .. | .. | .. | .. |
| " 1 " " " | | | | | .. | .. | .. | .. | .. | .. | .. | .. |
| Diminished over 100 per cent. | | | | | 1 | .. | .. | .. | .. | .. | .. | .. |
| " 100 " " " | | | | | .. | .. | .. | .. | .. | .. | .. | .. |
| " 90-100 " " " | | | | | 1 | .. | 2 | .. | .. | .. | .. | 1 |
| " 80-90 " " " | | | | | .. | .. | 1 | .. | .. | .. | .. | 1 |
| " 70-80 " " " | | | | | .. | .. | 1 | .. | .. | .. | .. | 2 |
| " 60-70 " " " | | | | | .. | .. | .. | .. | .. | 1 | .. | .. |
| " 50-60 " " " | | | | | .. | .. | .. | 1 | .. | .. | .. | .. |
| " 40-50 " " " | | | | | .. | .. | .. | .. | .. | 1 | .. | 1 |
| " 30-40 " " " | | | | | .. | .. | 1 | .. | .. | .. | .. | .. |
| " 20-30 " " " | | | | | .. | .. | .. | .. | .. | .. | .. | .. |
| " 10-20 " " " | | | | | .. | .. | .. | .. | .. | .. | .. | .. |
| " 5-10 " " " | | | | | .. | .. | .. | .. | .. | .. | .. | .. |
| " under 5 " " " | | | | | .. | .. | .. | .. | .. | .. | .. | .. |
| Stationary | | | | | 1 | .. | 1 | .. | .. | .. | .. | 1 |
| Increase | | | | | .. | .. | .. | .. | .. | .. | .. | 1 |

TABLE G.

SHOWING the Percentage of Chlorides found in the Blood Serum of 31 Male Epileptics, classified according to the effect of Treatment.

| Fits. | | | | .2 .25. | .25 .3. | .3 .35. | .35 .4. | .4 .45. | .45 .5. | .5 .55. | .55 .6. | .6 .65. | .65 .7. | .7 .75. |
|---------------------------------|----|----|----|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| None for 4 years | .. | .. | .. | .. | .. | 1 | .. | 1 | .. | .. | .. | .. | .. | .. |
| " 3 " | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| " 2 " | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| " 1 " | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Diminished over 100 per cent... | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| " 100 " | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| " 90-100 " | .. | .. | .. | .. | .. | .. | .. | 1 | 1 | .. | .. | .. | .. | .. |
| " 80-90 " | .. | .. | .. | .. | 1 | .. | .. | .. | .. | 1 | .. | .. | .. | .. |
| " 70-80 " | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | 1 | .. | .. |
| " 60-70 " | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| " 50-60 " | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | 1 | .. | .. |
| " 40-50 " | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | 1 | .. | .. | .. |
| " 30-40 " | .. | .. | .. | .. | .. | .. | .. | 1 | 1 | 1 | .. | .. | 1 | .. |
| " 20-30 " | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 |
| " 10-20 " | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| " 5-10 " | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. |
| " under 5 " | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. |
| Stationary | .. | .. | .. | .. | .. | 1 | .. | 2 | .. | 2 | .. | .. | .. | .. |
| Increase | .. | .. | .. | 1 | .. | .. | .. | 1 | 1 | 2 | .. | .. | .. | .. |

TABLE G1.

SHOWING the relationship between the present Age of the Patients, the Chloride Percentage and the effect of Treatment of 31 Males.

| Fits. | | | | .2 .25. | .25 .3. | .3 .35. | .35 .4. | .4 .45. | .45 .5. | .5 .55. | .55 .6. | .6 .65. | .65 .7. | .7 .75. |
|---------------------------------|----|----|----|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| None for 4 years | .. | .. | .. | .. | .. | 54 | .. | 60 | .. | .. | .. | .. | .. | .. |
| " 3 " | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| " 2 " | .. | .. | .. | .. | .. | .. | .. | .. | 40 | .. | .. | .. | .. | .. |
| " 1 " | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Diminished over 100 per cent... | .. | .. | .. | .. | .. | .. | 22 | .. | .. | .. | .. | .. | .. | .. |
| " 100 " | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| " 90-100 " | .. | .. | .. | .. | .. | .. | .. | 36 | 37 | .. | .. | .. | .. | .. |
| " 80-90 " | .. | .. | .. | .. | 52 | .. | .. | .. | .. | 46 | .. | .. | .. | .. |
| " 70-80 " | .. | .. | .. | .. | .. | .. | .. | 30 | .. | .. | .. | 32 | .. | .. |
| " 60-70 " | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| " 50-60 " | .. | .. | .. | .. | .. | .. | .. | .. | .. | 27 | .. | 32 | .. | .. |
| " 40-50 " | .. | .. | .. | .. | .. | .. | .. | .. | .. | 24 | 40 | .. | .. | .. |
| " 30-40 " | .. | .. | .. | .. | .. | .. | .. | 23 | 34 | 57 | .. | .. | 27 | .. |
| " 20-30 " | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 26 |
| " 10-20 " | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| " 5-10 " | .. | .. | .. | .. | .. | .. | .. | .. | .. | 51 | .. | .. | .. | .. |
| " under 5 " | .. | .. | .. | .. | .. | .. | .. | .. | .. | 41 | .. | .. | .. | .. |
| Stationary | .. | .. | .. | .. | .. | 20 | .. | 33·70 | .. | 23·23 | .. | .. | .. | .. |
| Increase | .. | .. | .. | 45 | .. | .. | .. | 41 | 31 | 27·28 | .. | .. | .. | .. |

TABLE H.

SHOWING the Blood Pressure classified according to the Age and the relationship between it and the Results of Treatment in Males.

| Fits. | Age, 15- 20. | Age, 20-30. | Age, 30-40. | Age, 40-50. | Age, 50-60. | Age, 60- 70. | Age, 70- 80. | Age, 80- 90. | Age, |
|-----------------------|--------------------|-----------------------|------------------------|------------------------|------------------|--------------------|--------------------|--------------------|------|
| None for 4 years .. | .. | .. | .. | .. | 150, 170 | .. | .. | .. | .. |
| " 3 " .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| " 2 " .. | .. | .. | 115 | .. | .. | .. | .. | .. | .. |
| " 1 " .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Diminution— | | | | | | | | | |
| Over 100 per cent. .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 100 .. | .. | 120 | .. | .. | .. | .. | .. | .. | .. |
| 90-100 .. | .. | .. | 110, 140 ^g | .. | .. | .. | .. | .. | .. |
| 80-90 .. | .. | .. | .. | 118 ^d | 120 | .. | .. | .. | .. |
| 70-80 .. | .. | .. | 100, 100 | .. | .. | .. | .. | .. | .. |
| 60-70 .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 50-60 .. | .. | 110 ^b | 120 ^f | .. | .. | .. | .. | .. | .. |
| 40-50 .. | .. | 130 ¹ | 110 | .. | .. | .. | .. | .. | .. |
| 30-40 .. | .. | 110, 120 | 120 | .. | 130 ^e | .. | .. | .. | .. |
| 20-30 .. | .. | 120 ² | .. | .. | .. | .. | .. | .. | .. |
| 10-20 .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 5-10 .. | .. | .. | .. | .. | 120 | .. | .. | .. | .. |
| Under 5 .. | .. | .. | .. | 130 ^a | .. | .. | .. | .. | .. |
| Stationary .. | 100 | 120 | 120 ⁱ , 130 | .. | .. | 120 ^g | .. | .. | .. |
| Increase .. | .. | 120, 100 ^c | 100, 140 | 110 ^h , 110 | .. | .. | .. | .. | .. |

FEMALE BLOOD PRESSURE.

| | Mainly Diurnal. | Mainly Nocturnal. | Change, Diurnal to Nocturnal. | Change, Nocturnal to Diurnal. |
|-----------------------|--------------------|----------------------|----------------------------------------|----------------------------------------|
| None, 4 years .. | 110, 110 | .. | .. | .. |
| " 3 " .. | .. | .. | .. | .. |
| " 2 " .. | .. | .. | .. | .. |
| " 1 " .. | .. | .. | .. | .. |
| Over 100 per cent. .. | .. | 110 | .. | .. |
| 100 .. | .. | .. | .. | .. |
| 90-100 .. | 110, 110, 110 | .. | .. | 90 |
| 80-90 .. | 110 | 120* | .. | .. |
| 70-80 .. | 100 | 120 | .. | 120 |
| 60-70 .. | 150 | .. | .. | .. |
| 50-60 .. | 110 | .. | .. | .. |
| 40-50 .. | 90 | 110 | .. | .. |
| 30-40 .. | 110 | .. | .. | .. |
| 20-30 .. | .. | .. | .. | .. |
| 10-20 .. | .. | .. | 90 | .. |
| 5-10 .. | .. | .. | .. | .. |
| Under 5 .. | .. | .. | .. | .. |
| Stationary .. | 110, 110 | .. | 110* | .. |
| Increase .. | .. | .. | .. | 110 |

* Highest reading afternoon and evening.

TABLE J.—MALES.

| — | | | | Grand Mal. | Petit Mal. | Mixture. |
|-------------------------------|----|----|----|------------|------------|----------|
| None for 4 years | .. | .. | .. | 2 | .. | .. |
| " 3 " | .. | .. | .. | .. | .. | .. |
| " 2 " | .. | .. | .. | .. | 1 | .. |
| " 1 " | .. | .. | .. | .. | .. | .. |
| Diminished over 100 per cent. | .. | .. | .. | .. | .. | .. |
| " 100 | .. | .. | .. | 1 | .. | .. |
| " 90-100 | .. | .. | .. | 1 | 1 | .. |
| " 80-90 | .. | .. | .. | 11 | .. | .. |
| " 90-80 | .. | .. | .. | 1 | 1 | .. |
| " 60-70 | .. | .. | .. | .. | .. | .. |
| " 50-60 | .. | .. | .. | 2 | .. | .. |
| " 40-50 | .. | .. | .. | 1 | 1 | .. |
| " 30-40 | .. | .. | .. | 1 | 2 | 1 |
| " 20-30 | .. | .. | .. | .. | .. | 1 |
| " 10-20 | .. | .. | .. | .. | .. | .. |
| " 5-10 | .. | .. | .. | .. | .. | 1 |
| " under 5 | .. | .. | .. | 1 | .. | .. |
| Stationary | .. | .. | .. | 2 | 1 | 11 |
| Increase | .. | .. | .. | 11 | 2 | 11 |

TABLE J.—FEMALES.

| — | | | | Grand Mal. | Petit Mal. | Mixture. |
|-------------------------------|----|----|----|------------|------------|----------|
| None, 4 years | .. | .. | .. | 2 | .. | .. |
| " 3 " | .. | .. | .. | .. | .. | .. |
| " 2 " | .. | .. | .. | .. | .. | .. |
| " 1 " | .. | .. | .. | .. | .. | .. |
| Diminished over 100 per cent. | .. | .. | .. | 1 | .. | .. |
| " 100 | .. | .. | .. | .. | .. | .. |
| " 90-100 | .. | .. | .. | 2 | 1 | 1 |
| " 80-90 | .. | .. | .. | 2 | .. | .. |
| " 70-80 | .. | .. | .. | 1 | 2 | .. |
| " 60-70 | .. | .. | .. | .. | .. | 1 |
| " 50-60 | .. | .. | .. | 1 | .. | .. |
| " 40-50 | .. | .. | .. | 2 | .. | .. |
| " 30-40 | .. | .. | .. | .. | 1 | .. |
| " 20-30 | .. | .. | .. | .. | .. | .. |
| " 10-20 | .. | .. | .. | 1 | .. | .. |
| " 5-10 | .. | .. | .. | .. | .. | .. |
| " under 5 | .. | .. | .. | .. | .. | .. |
| Stationary | .. | .. | .. | 3 | .. | .. |
| Increase | .. | .. | .. | 1 | .. | .. |

LANTERN DEMONSTRATION ON THE BRAIN IN AMENTIA.

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Given in conjunction with the Lecture on Diseases of Children, after a display of cases of Cretins and Mongols, by Dr. A. J. Wood.

Definition of Amentia.—To meet the purposes of this demonstration the term amentia was restricted to those gross forms of mental deficiency

which appear in childhood, and are due to either hereditary or acquired factors affecting the development of the brain.

Amentia must be carefully distinguished from dementia, the latter being due to degeneration of structures already developed.

Material for Demonstration.—The material for demonstration was gathered from observations with necropsies on sixty-seven cases of amentia, and points in the morbid anatomy and histology of most of the varieties mentioned in the following classification were illustrated.

Classification of Cases of Amentia.—A comprehensive consideration of etiological, pathological, and clinical data allows the division of cases of amentia into two main classes—

- I. Primary or intrinsic, dependent on causes inherent in the germinal plasm.
- II. Secondary or extrinsic, dependent on causes extrinsic to the germinal plasm.

CLASS I.—PRIMARY OR INTRINSIC AMENTIA.

Causal Factors.

- (a) Psychoses, neuroses, and other diseases, especially alcoholism, tuberculosis, and syphilis, in the parents.
- (b) Consanguineous marriage.
- (c) Procreative immaturity or incompatibility (primogeniture—youth, old age, or dissimilar age of parents).
- (d) Physical disorder at time of conception.

Varieties of Amentia to be placed under this Heading.

1. True microcephaly.
2. Cases of amentia presenting brains of fair size, but a primitive gyral pattern and microscopic evidence of arrested development.
3. Cases of amentia presenting brains of normal size and conformation, but microscopic evidence of arrested development.
4. Agenesis of lobes or parts.
5. " Amaurotic family idiocy."
6. Tuberoze sclerosis.
7. Hypertrophy of the brain (true megalcephaly).
8. Juvenile general paralysis.
9. Hydrocephaly.
10. Hemisclerosis cerebri.
11. Epileptic or eclamptic idiocy, without gross cerebral lesion.

} These may also be brought about by extrinsic causes.

CLASS II.—SECONDARY OR EXTRINSIC AMENTIA.

Causal Factors.

- (a) Conditions affecting the mother or embryo during pregnancy.
- (b) Trauma at birth and trauma or disease (particularly epilepsy) in infancy.
- (c) Deprivation of the senses.
- (d) Disease of specific organs which influence tissue growth.

Varieties of Amentia to be placed under this Heading.

1. False microcephaly.
2. Porencephaly (true and false).
3. Localized microgyria.
4. Meningo-encephalitis.
5. Cretinism.

TYPHOID CARRIERS.

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At the Kew Hospital for the Insane, in the month of April, 1906, a male patient was reported to have had a typical attack of typhoid fever. No more cases were recorded till February, 1907, when the specific febrile condition was discovered in a female patient. This marks the beginning of an epidemic associated with the main asylum, and affecting female patients, nurses, and one child of a member of the staff, living practically inside the walls of the institution. No case was reported in the main asylum after March, 1908, but, during the period of epidemic amongst the female adult patients, typhoid fever installed itself with the idiot children—individuals housed at some distance from the main building, and having little or no direct communication with it. Possible indirect means for the spread of the infection were known, but a consideration of these is not needed for the present purpose.

The cases which occurred are roughly tabulated on the following statement on a monthly occurrence basis :—

TABLE A.

| Date. | | | | Number of Cases of Typhoid Fever. | | | | | Number of Cases fatal. | | | | Total. | |
|-------------------|--|--|--|-----------------------------------|--------|---------|--------|-----------|------------------------|--------|-----------------------|--------|-----------|--------|
| | | | | Asylum. | | Nurses. | | | Asylum. | | Nurses. | | | |
| | | | | Main. | Idiot. | Main. | Idiot. | Outsider. | Main. | Idiot. | Main. | Idiot. | Typhoids. | Total. |
| | | | | | | | | | | | | | | |
| 1906. | | | | 1 | .. | .. | .. | .. | .. | .. | .. | 1 | .. | |
| April | | | | 1 | .. | .. | .. | .. | .. | .. | .. | 1 | .. | |
| 1907. | | | | 6 | .. | 1 | .. | 1 | 1 | .. | .. | 2 | 1 | |
| February | | | | 6 | .. | 1 | .. | 1 | 1 | .. | .. | 2 | 1 | |
| March | | | | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. | |
| April | | | | .. | .. | 1 | .. | .. | .. | .. | .. | .. | 1 | |
| May | | | | 1 | 3 | 1 | .. | .. | 1 | .. | .. | 5 | 1 | |
| June | | | | .. | 4 | .. | 2 | .. | .. | 2 | .. | 6 | 2 | |
| July | | | | .. | 6 | .. | 3 | .. | .. | 2 | .. | 9 | 2 | |
| August | | | | 1 | 3 | .. | .. | .. | .. | 1 | .. | 4 | 1 | |
| September | | | | 3 | 1 | 5 | .. | .. | 1 | 1 | 1 | 9 | 3 | |
| October | | | | 1 | 2 | .. | .. | .. | .. | 2 | .. | 3 | 2 | |
| November | | | | 3 | 2 | .. | 1 | .. | 1 | .. | .. | 6 | 1 | |
| 1908. | | | | 1 | .. | .. | .. | .. | .. | .. | .. | 1 | .. | |
| March | | | | 1 | .. | .. | .. | .. | .. | .. | .. | 1 | .. | |
| April | | | | .. | 4 | .. | .. | .. | .. | 1 | .. | 4 | 1 | |
| June | | | | .. | 1 | .. | .. | .. | .. | .. | .. | 1 | .. | |
| August | | | | .. | 1 | .. | .. | .. | .. | .. | .. | 1 | .. | |
| September | | | | .. | 1 | .. | .. | .. | .. | .. | .. | 1 | .. | |
| Totals | | | | 19 | 28 | 8 | 6 | 1 | 4 | 9 | 1 | .. | 62 | 14 |
| Percentages | | | | .. | .. | .. | .. | .. | 21 | 32 | 7 (for all nurses) | .. | 22 | |

With regard to the fever, we knew that the cause must have been a specific bacillus of the typhoid type, but to discover how this cause gained access, and by what means it was spread, so as to give rise to the epidemic or epidemics mentioned, exercised the minds of all those responsible to no mild degree. The available facts were investigated by the Board of Health, and data collected. Conclusions were arrived at, and suggestions were acted on. But it must be remembered that the epidemic in the main asylum dragged on for fourteen months, and that at the Idiot Asylum, having started in May, 1907, was still in active operation in September, 1908.

Among many possible sources of infection, some individual or individuals unsuspectedly eliminating pathogenic bacilli, was suggested by Dr. Jones. The weight of the ascertained facts, recorded by several observers, pointing to the possibility of a typhoid carrier, could not be overlooked in our considerations, and a search was instituted, and the question faced in a practical manner. The proper dealing with this subject, in order that it might lead to a useful end and an accurate conception of what was before us, demanded that all the facts connected, directly or indirectly, with all its aspects should be looked into, and an endeavour made to record all available data bearing on our investigation.

The first part of this paper consists principally of a review of the current literature, in so far as it stands in direct or indirect relation to the matter under consideration. The second part will note the more or less practical details and observations associated with the bacteriology. In undertaking an examination of the human fæces, the writer was handicapped, owing to the fact that no connected account could be obtained of the methods and likely results of such an examination. Scattered facts and theoretical matters had to be searched out and pieced together. The writer offers the necessary early apology for all defects, and acknowledges that what is to follow is mostly a compilation from many sources which demanded a mild industry, rather than any particular skill.

Foster and Kayser (1), in 1906, gave the name, bacillus carriers, to those persons who, weeks or years after an attack of typhoid fever, were found, by cultural methods, to be eliminating typhoid bacilli in their stools.

In the same year, Lentz (2) fixed an arbitrary standard, and called bacillus carriers those from whom the specific organism was isolated ten weeks after the onset of an initial typhoid fever or of a relapse. The year 1905, then, gave recognition to a class of persons previously unsuspected of doing harm, but now known to be a potential or real sources of infection, even after the febrile stage of typhoid has passed. It becomes necessary to know, further, that it is probable a certain percentage of all "enteric" cases become carriers, and that their stools form the first external point from which infection may spread. The stools of those suffering from typhoid fever have been investigated bacteriologically, both during the febrile and past febrile periods, and present facts applicable to our subject.

Brion and Kayser (3) 1905, found that during the active fever at end of first week, 32 per cent. showed typhoid bacilli in stools; at end of second week, 35 per cent. showed typhoid bacilli in stools; at end of third week, 45 per cent. showed typhoid bacilli in stools. Also, in 154 convalescent patients (fifteen days normal), 93 per cent. failed to show bacilli in the fæces. In 54 per cent. of them the urine was, in like

manner, germ free. These investigators, in addition, found typhoid bacilli in the fæces of six healthy persons, three of whom had never had typhoid, but had been intimately associated with fever patients. The other cases had had typhoid 7, 10, and 15 months previously.

Koch has also shown that the Eberth bacillus may be found in the intestinal dejecta of those who come into close contact with acute febrile typhoid cases, and that, in this way, certain individuals, though not succumbing to a systemic infection, yet become intermediate hosts for the multiplication and passage of the disease organisms. In most of Koch's cases, the bacilli had an ephemeral existence, but, in one case, positive results were obtained from examinations extending over 21 months. Klinger also found bacilli in the stools of twelve cases, from whom no history of previous typhoid could be obtained. In parentheses it might be mentioned that these last facts open up the question of the contagiousness of typhoid, but which question cannot be pursued further here.

Instructive facts were obtained recently by Pratt, Peabody, and Long (4). They examined the fæces of one hundred cases of typhoid fever, using 206 stools. Hiss' medium, Drigalski, and malachite green plates provided initial means of culture. The bacilli sought for was only found in seventeen cases. Twenty-one convalescents all gave negative results. Febrile cases thus showed a percentage of 21. It was ascertained that the bacilli may appear in one stool and be absent in the next. That there was no connexion between the diarrhœa and the number of specific organisms present. In one case, four days before death, fæces were examined by the Drigalski-Conradi method, and gave negative results. *Post-mortem*, there was found—

- In the bile—many typhoid bacilli.
- In the jejunum—no typhoid bacilli.
- In the ileum—no typhoid bacilli.
- In the ileo-cæcal valve—no typhoid bacilli.
- In the spleen—typhoid bacilli.
- In the heart's blood—no typhoid bacilli.

There was no evidence that the bacilli increased with the ulceration of the intestinal wall. In this connexion, Von Drigalski found that he was often unable to obtain bacilli from the ulcers direct, even when they were flourishing in the intestinal contents. It must be remembered also, in relation to this, that the micro-organisms may be found in great numbers after the ulcers have healed.

The foregoing facts bear a close relation to what is to follow, and aid us in arriving at a clear idea as to the way in which bacilli carrying is brought about. Among the foregoing considerations it will be noted that, even during the febrile stage of typhoid fever, the bacilli cannot always be demonstrated in the stools, despite careful investigators and accurate methods of research. In the case cited by Pratt, Peabody, and Long, on which a *post-mortem* examination was made, it will be noted that the intestine failed to give the expected cultures, though the bile did not disappoint.

We are now beginning to believe that too much significance has been placed upon intestinal infection. Recent research into the nature of typhoid fever, bacteriological examination of the blood during and after

the febrile stage of the disease, operative and *post-mortem* examinations of the gall bladder and its contents, together with experiments on animals, all tend to cause us to modify our views relating to the theory of the disease, and force us to place great significance upon the tendency of the gall bladder to become a breeding-ground for the typhoid bacilli. The place the gall bladder takes in bacilli carrying will be pointed out at a later stage, but facts bearing on the association of gall bladder infection and typhoid fever on the one hand, and typhoid fever and gall bladder disease on the other, will now be dealt with. Pratt (5), in thirty fatal cases, found the typhoid organism in the bile twenty-one times. Levy and Kayser (6) reported the case of a woman who had had typhoid fever in 1903. In 1905, on two occasions, the bacillus was found in her stools. In October, 1906, she died of pneumonia. On *post-mortem* examination in the gall bladder, there was found a concretion containing typhoid bacilli, which were also present in the spleen and liver. It was concluded that during life the gall bladder was the seat of bacilliary growth, and from it there was constant re-infection of the intestine. Doerr (1905), (7), obtained cultures from a gall stone and pus of gall bladders in two cases in which there had been typhoid seventeen and twenty years previously.

It has been shown (8) that in most cases in which the typhoid bacillus has been demonstrated in the gall bladder that the organ remains normal, but in some cases there may be catarrh, jaundice, or acute cholecystitis, and that the pathological condition may be present during active typhoid fever or after the disease has long passed and a previous history only can be obtained. We have now come to believe that the gall bladder in many instances stands guilty of providing a home for the enemy. Evidence points to the conclusion that the blood stream provides the way by means of which the bacilli are carried to their lodgment.

Blackstein and Welch (9) injected living typhoid organisms into dogs intravenously and found the bacilli in the gall bladder several months after, whilst the other organs failed to give positive results. The bacilli appeared in the bile twenty-four hours after injection, even when moderate amounts were used. Five control animals remained sterile.

Doerr (9) also injected typhoid bacilli intravenously, in one experiment cutting the cystic duct and in another the common duct. In the former case, no bacilli entered the gall bladder; in the other case they were found in the bile, and it was concluded that the germs found their way from the blood into the liver secretion and thence to the gall bladder. It was also found that the micro-organisms appeared in the bile eight hours after injection; that *B. Coli*, *B. Paratyphosus*, and *B. Typhosus* could pass along the same channels, as indicated above, but not *B. Dysenteriae* (Flexner). Thus it has been seen that in the lower animals bacilli may find their way out of the blood vessels and become lodged in the gall bladder. It is likely that in human beings gall bladder infection also takes place through the agency of the blood. Lately, Coleman and Buxton (10) have recorded the typhoid fever blood examination results of thirty-three authors, including themselves. The figures are:—

| Cases. | Bacilli found. | Bacilli not found. | Percentage found. |
|--------|----------------|--------------------|-------------------|
| 1,602 | ... | 1,197 | ... |
| | | 405 | 75 |

These results show conclusively that in a large number of cases the bacilli have been proved to circulate in the blood stream. Coleman and Buxton also proved that the bacillæmia was present during the febrile stage only, and disappeared with the return of the body heat to normal. They considered that the bacilli-loaded blood is the result of an overflow from the lymphoid tissue, and the lymphopoietic organs in which is the seat of primary growth.

Muller and Graf (11) investigated the clot obtained from the capillary tubes sent for the Widal test in eleven cases. In eight they found typhoid and paratyphoid bacilli. To another worker (11), 294 cases were sent for the agglutination test. The clot was spread on the Drigalski-Conradi medium for culture. The result was:—

| | | | | |
|-------|-----|-----|-----|-----------|
| Clot | ... | ... | ... | 12 cases. |
| Serum | ... | ... | ... | Nil. |

Of the remaining 282 cases, 194 proved clinically not to be typhoid. The clot obtained from each tube amounted to .1 to .15 c.c., and when positive gave 1 to 21 colonies in various cases with one exception, where 1,600 paratyphoid colonies grew. Fornet (11) investigated the blood of nineteen cases. He incubated the clot in an ox-bile medium and obtained a positive result in fourteen cases. He was able to give a diagnosis even when the fever was a few days old, and when the Widal test gave negative results. Where the examination has been carried out systematically, it has been found to be a more reliable means of diagnosis than the familiar Widal agglutination reaction. In clot examination it has been found advantageous to use a medium containing ox-bile, which not only presents a fluid in which the bacilli freely grow and multiply, but provides a means of dissolving the clot and setting free the organisms and neutralizing the bacteriacidal power of extravascular blood. Conradi (12) used ox-bile in 1901.

The Widal reaction in its relation to the post-febrile persistence of the specific organism cannot be looked upon as a sure index to the likelihood of the bacillus being present and discovered. In glancing at the cases of carriers tabulated below, it will be seen that the reaction was shown in a good percentage, but it must be remembered that the number of those who possess an agglutinating serum is probably much greater than the number of those who are acting as carriers. It is also certain that if the fæces of only those who reacted to the Widal test were examined, some carriers would be overlooked.

French and Louissan (13) have given the results of an examination into the percentages of those in which the Widal reaction persists after the fever. One hundred and thirty-five patients had been treated in Guy's Hospital for typhoid fever, and all had given a positive reaction with their serum (1 to 200 diluted 30 minutes). Post-febrile periods varied from two months to ten years. It was recorded that—

- (1) 7.5 per cent. gave a complete, 22.5 an incomplete reaction;
- (2) the interval after the illness made little difference;
- (3) men gave a complete reaction in 11 per cent., women none;
- (4) suppurative (post-typhoidal) conditions caused little alteration;
- (5) the age bore no relation to likelihood to reaction.

It may be noted here that in gall-bladder conditions proved to be due to the typhoid bacillus an association has been found with the serum giving agglutinative results. Consequently, where it is thought that a gall-bladder condition might be giving rise to bacillus carrying, the blood of the individual should be examined by the Widal test.

The conclusions to be drawn from the facts so far related are:—

- (1) that typhoid bacilli are demonstrable in only a certain percentage of stools of those acutely ill;
- (2) that bacilli in a small percentage of cases persist in the fæces for varying periods after the fever has subsided; these cases in this way become carriers;
- (3) that the bacilli can be demonstrated in the blood frequently;
- (4) that the bacilli probably leave the blood stream in the liver and enter the gall bladder,
- (5) bacilli may flourish in the gall bladder and produce pathological conditions and constant re-infection of the intestine;
- (6) that healthy persons who come in contact with fever cases may act as intermediate hosts and become carriers;
- (7) that a person giving the Widal test may not be a carrier, and *vice versa*.

Since 1905 there has been recorded in current medical literature cases and epidemics of typhoid fever, directly traceable to carriers, and in one well-defined case a medical man probably carried with him a possible source of infection for twenty-nine years, though no disease was directly due to him, so far as was known.

In the year 1906, Nieter and Liefman (14) investigated an epidemic of typhoid that had occurred in an asylum containing 900 female patients. Seven carriers were found, two of whom were suffering from dysentery at the time of the investigation. The blood of the dysentery cases gave positive agglutination reaction to typhoid and dysentery bacilli.

Kayser (1906) (15) has recorded that of 205 cases occurring in Strassburg, 28 were traceable to healthy carriers. On another occasion six chronic carriers were found who had given typhoid to others. Klinger (15) discovered 23 carriers in a little more than two years, all of whom presented typhoid bacilli in the stools and eight in the urine.

Lentz (15) collected 98 examples from seven sanitary stations in Germany, and has concluded that 4 per cent. of all enteric patients become carriers. In one case the specific micro-organism was found forty-two years after the acute febrile condition, and was present in the stools over a period of one and three-quarter years. This one person had been proved to be a source of infection in twelve cases. By those who have looked into this matter, it has been discovered that often the bacillus exists in the voided intestinal contents as almost a pure culture, and that in these instances it seems to replace the colon bacillus and the ordinary intestinal flora. The data available in the records here have been collected and tabulated with interesting results.

TABLE B.

| Date. | Recorded by. | Date of Consequent Epidemic. | Number of Cases in Epidemic. | Number of Carriers. | | Occupation of Carriers. | Agglutination in Carriers. | Previous Typhoid in Carriers. | Disease associated with. | Bacilli found in. | Bacteriology. |
|-------|-------------------------|---------------------------------------------|----------------------------------------------------------------------|------------------------|------|-----------------------------|---------------------------------------------------------------------------------|-----------------------------------------------|--------------------------------|-------------------------|-----------------------------------------------------------------------|
| | | | | Female | Male | | | | | | |
| 1905 | Klinger | 1905 | .. | 1 | .. | Washerwoman | 1-1,000 | 1 year | .. | Faeces | Free February and March, 1905 September, found with epidemic |
| 1906 | Kayser | .. | .. | 1 | .. | Baker | 1-100 | 10 years | .. | Faeces | |
| 1906 | Kayser | .. | 17 | 1 | .. | Milk trade | .. | .. | .. | .. | |
| 1906 | Nieter and Liefmann | .. | .. | 1 ? | .. | Patients in Asylum | (1) { 1-100 typhoid 1-500 dysentery (2) { 1-50 typhoid 1-100 dysentery | Old cicatrices in intestine in one case | Two had dysentery | Faeces | 1 Bacillus Flexner 1 not Bacillus Flexner |
| 1907 | Nieter | 1907 | .. | 4 ? | .. | Patients in Asylum | .. | .. | .. | .. | |
| 1907 | Nieter | 1907 | 3 female attendants | 1 | .. | Patient | .. | .. | .. | .. | Paratyphoid B and typhoid bacilli |
| 1907 | Friedel | 1907 | .. | 1 | .. | In kitchen preparing salads | .. | Never had had typhoid | .. | .. | |
| 1907 | Soper | .. | 7 households affected | 1 | .. | Cook | Widal | .. | .. | Faeces | |
| 1908 | Ledingham and Ledingham | Cases, 1893, 5, 6, 7, 9 1900, 1, 3, 4, 6, 7 | 3 female attendants (31) { 1 male attendant 24 female patients | 3 | .. | Patients in Asylum | (1) 1-200 (2) 1-200 (3) | .. | .. | Faeces | |
| 1908 | Dean | No epidemic | No epidemic | .. | 1 | Medical Practitioner | 1-25 | 29 years | Biliary colic and jaundice | Faeces | B. Typh. B. Faecalis Alkaligenes. B. Coli. |
| 1908 | Branthwaite | 1906-7 | 28 | 1 | .. | Dairymaid | Widal | 6 years | .. | Faeces | |
| 1908 | Chalmers | Dec. and Jan., 1907-1908 | .. | 1 | .. | Dairymaid | Widal | 10 years | .. | Faeces | Bacilli few |

In the twelve records tabulated above, it will be noted that most of the carriers were women. Relative to this fact, it has been pointed out that the greater frequency of gall-bladder disease in women, and their greater liability to be proved typhoid carriers, shows something more than a mere coincidence. Lately, pathological conditions of the gall-bladder have been studied to discover an association with an agglutinating power of the blood serum of the individuals, in which the gall-bladder disease shows itself clinically, and, in a certain percentage, this association has been established. The table also indicates that many of the carriers had had typhoid several years previously, but that one case proved to be an intermediate host, never having had the disease. In two of the asylum cases, the carrying capacity existed with dysentery—a disease not infrequent in asylums, and a disease which might always be investigated bacteriologically with advantage.

In the case of our own epidemic, the fæces of 30 individuals, who had had typhoid, were examined. One girl, nine months after her fever had subsided, showed typhoid bacilli in her stools. This brings our percentage of carriers within the limit laid down by Lentz, and accentuates the great necessity for special precautions to be taken in asylums, and other similar institutions, even after the acute febrile period has passed. When we consider that in such places, where numbers are more or less crowded together, that sanitary conditions are often far from perfect, and that the personal hygiene of the inmates is markedly defective, we can appreciate how those under our care are surrounded with danger, and how alive we, who are morally and legally responsible, must be to all preventable possibilities of infection. It behoves us not to allay our attention, even when the disease has passed, but to track all possibilities to the end of their long trail. It may seem tautological to say that preventable diseases should be prevented, but the non-prevention of these, on account of the practical difficulties which present themselves, of the want of knowledge and lack of appreciation of ascertained facts, makes such a statement necessary.

BACTERIOLOGY:

The normal bacteriology of the human fæces has been studied by many, and organisms of intestinal type will be named on various occasions in the matter to follow.* The best work dealing with fæces and fæcal contaminations has been by the water investigators, and it is mostly from their records that a useful knowledge has been obtained.

In the method here adopted, generalities will first be dealt with, and will gradually lead to a more detailed consideration. In our research, we have had under observation some thousands of colonies, and have submitted over a thousand separate colonies to a more or less searching inquiry. It has been learned that the common bacteria found in the stools divide themselves into two big groups—

1. Group of colon bacillus-like organism.
2. Group of streptococcal organisms.

In many stools the first group predominates; but in a small percentage streptococcal forms were found to outnumber the others. The factor (or factors) determining which class should prevail, was not discovered; but indications have been found of a possible cause of the variation, and will be followed in later experiments.

Bacteria, other than those contained in the two already mentioned groups, were uncommon, and it would be in this third group that the specific pathogenic varieties would be looked for.

The intestinal flora may be made to take their place in big classes depending on their bio-chemical reactions with sugars—a differentiating method of examination first carried out in detail by Professor Theobald Smith. These classes are—

- A. Those which ferment lactose with acid and gas productions.
- B. Those which ferment glucose with acid and gas productions, but not lactose.
- C. Those which do not ferment lactose or glucose as above.

Groupings of specific organisms and analytical classifications of the same will be given in the places into which they conveniently fall. In dealing with fæces, we have to do with a material consisting of a complex mixture of dead organic matter and living organisms. To separate the bacteria and obtain the usual pure cultures, is the first task. Mechanical methods have been devised with more or less success (16). The usual method, however, is to make use of cultural media, containing substances which—

- (1) Inhibit undesirable growths.
- (2) Give differentiating reactions.

In the inhibiting class of substances we have—

- (a) Potassium iodide.
- (b) Phenol.
- (c) Kristall violet.
- (d) Ox-bile or sodium taurocholate.
- (e) Fermentable bodies.
- (f) Caffeine.
- (g) Malachite green.

In dealing in detail with these, it may be remarked that potassium iodide and phenol were used more extensively at an earlier period of bacteriological research, and have been, to a large extent, replaced by other materials. Kristall violet is used in the Drigalski-Conradi medium, and is said to inhibit the growth of most saprophytic organisms. It also helps to give a colour differentiation. Grunbaum and Hume (17) suggested that it be used in combination with neutral red, each of the strength of 1—100,000 in a lactose agar medium, in order to give colonies of a blue and red colour, according to the acid-producing power of the organisms. Ox-bile is used in blood culture media, as already noted; but in fæcal investigations sodium taurocholate, being of known and constant quality, has come to be relied upon exclusively. It allows to grow bacteria of the intestinal type, but inhibits others. The following have been found to grow in a bile-salt medium:—

- B. Coli. Comm.
- B. Enteriditis (Gærtner).
- B. Acidi lactici.
- B. Cavicida.
- B. Neapolitanus.
- B. Paratyphosus.
- B. Pneumoniæ.
- B. Cloacæ.
- B. Of Hog Cholera.
- B. Typhosus.
- B. Pyogenes fœtidus.
- B. Dysenteria.

B. Cholerae.
 B. Prodigiosus.
 B. Fæcalis alkaligenes.
 Proteus vulgaris.
 Staphylo- and Strepto-cocci.

In a mixture of organisms growing in a medium containing a fermentable body, those fermenting that body will outgrow those not fermenting it. In searching for paratyphoid bacilli in fæces, Boycott (18) made use of dulcite, which body paratyphoid organisms ferment. He found ordinary plate cultures to give negative results, whilst with preliminary fermentations he obtained positive results. He recorded the following laboratory experiment:—He took approximately equal quantities of—

1. Paratyphoid B (fermenting dulcite, but not lactose).
2. Coli. 1 (fermenting lactose and dulcite).
3. Coli. 4 B. Ac. Latici (fermenting lactose, but not dulcite).

TABLE "C."

| | | | | P.C. on Plate. | |
|-----------------------|-------------|-----|-----|----------------|---------|
| | | | | Coli. | Paraty. |
| Paratyphoid + Coli 1. | Plain broth | ... | ... | 19 | 81 |
| | Lactose | ... | ... | 96 | 4 |
| | Dulcite | ... | ... | 18 | 82 |
| Paratyphoid + Coli 4. | Plain broth | ... | ... | 95 | 5 |
| | Lactose | ... | ... | 99 | 1 |
| | Dulcite | ... | ... | 1 | 99 |

Incubated 20 hours at 37 degrees C.

Sugars added to MacConkey bile-salt-peptone water.

Caffeine has been recommended and tried. In certain percentages, in nutrient media, it is said to inhibit the growth of colon bacilli and others, and to allow typhoid bacilli to grow and multiply. We have tried it with stools, and with laboratory cultures of colons and typhoids, and have found it unreliable and of no practical use in comparison with other methods.

Malachite green (special types), like caffeine, is supposed to allow typhoid bacilli only to flourish in media containing the dye, but owing to the fact that supplies were unobtainable, it could not be tried.

Substances used to give differentiating reactions are:—

- (a) Fuschin decolourized by sodium sulphite.
- (b) Kristall violet with (c) or (d).
- (c) Litmus.
- (d) Neutral red.

Endo combined fuschin decolourized by sodium sulphite with nutrient media, and thereby produced a means of distinguishing between typhoid and colon colonies. On Endo's medium, the colon bacillus grows as a deep red colony, and the typhoid takes on no definite colour. This medium we have tried, and have concluded that it is valuable, not only on account of its colour property, but also owing to the fact that various kinds of bacilli give characteristic colonies. Kristall violet has already been mentioned. The use of neutral red with solid agar media, and in particular with that now known as MacConkey's, was suggested by Grunbaum and Hume (17) in 1902.

The colour changes in the above substances are supposed to depend upon the production of an acid, alkaline, or neutral reaction in the medium

to which a fermentable body—sugar, alcohol, or glucoside—has been added. It seems demonstrable that some factor apart from the mere fermentation and acid production is necessary to bring about the colour change. In our experiments—using MacConkey bile—salt, lactose, neutral red, agar slopes, for bacilli, sub-cultured from plates, we found in some instances that although lactose fermentation, with acid production, took place in certain classical media (lactose-nutrose-litmus, litmus milk, lactose agar), yet the MacConkey slope gave a colourless growth. In a paper of F. W. Andrews (19), read before the Pathological Society of London, this point was dwelt upon. The colour changes produced by different organisms grown on MacConkey lactose agar and in litmus broth were compared. The tables are here reproduced, with slight modification in arrangement, the facts noted being unaltered.

TABLE "D."

| | Isodulcit. | Glucose. | Saccharose. | Lactose. | Raffinose | Glycerine. | Mannite. | Salicin. |
|------------------------------------|------------|----------------|----------------|----------------|-----------|----------------|-----------|----------------|
| | N.R. L.B. | N.R. L.B. | N.R. L.B. | N.R. L.B. | N.R. L.B. | N.R. L.B. | N.R. L.B. | N.R. L.B. |
| B. Coli. Comm. .. | ++ | ++ | . . | ++ | . . | ++ | ++ | <div>. +</div> |
| B. Enteritidis .. | ++ | ++ | . . | . . | . ? | . . | ++ | . . |
| B. Paratyphosus A Schotmuller | ++ | ++ | . . | . . | . . | <div>+ .</div> | ++ | . . |
| B. Paratyphosus B Schotmuller | . ? | ++ | . . | . ? | . . | <div>+ .</div> | ++ | . . |
| B. Typhosus .. | . . | ++ | . . | . . | . . | ++ | ++ | . . |
| B. Dysenteriae (Shiga) .. | . — | ++ | . . | . . | . ? | <div>+ .</div> | . . | . — |
| Streptococcus fæ- calis .. | ? + | ++ | ++ | ++ | ? . | <div>. +</div> | ++ | ++ |
| Staphaloeoccus pyogenes aureus | . . | <div>. +</div> | <div>. +</div> | <div>. +</div> | . . | ++ | ++ | . . |
| Staphaloeoccus epidirmidis alb. | . — | ? — | ? — | ++ | . — | + — | . . | . — |

N.R. = Neutral red medium containing fermentable body.

L.B. = Litmus broth " " " "

N.R.—

+ = Red Colonies.

. = Colourless.

? = Doubtful.

L.B.—

+ = Acid.

. = No acid.

? = Doubtful.

Gas disregarded.

Cultures grown aerobically.

In our work we found that the bacilli growing on a lactose—bile salt, neutral red—nutrient agar medium (MacConkey) could be roughly grouped as follows:—

1. Definite red colonies showing in 24 hours incubated at 37 degrees.
2. Pinkish colonies, or those showing a small red central dot with further incubation.
3. Colourless colonies which fermented lactose in classical tests.
4. Colourless colonies which did not ferment lactose in classical tests.
5. Very small, clear, slow-growing colonies, evidently much inhibited in growth by the medium.

Each group did not represent a specific bacillus but provided useful information for further guidance.

Taking the common intestinal bacilli included in the above groups, they could be additionally classified in relation to their bio-chemical differences as follows:—

TABLE "E."

| | | |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|
| Typhoid group | $\left\{ \begin{array}{l} \text{B. Typhosus} \\ \text{B. Cholerae} \\ \text{B. Dysenteriae} \\ \text{B. Faecalis Alkaligenes} \end{array} \right\}$ | Do not ferment lactose or glucose with gas formation |
| Hog cholera Group | $\left\{ \begin{array}{l} \text{B. of Hog Cholera} \\ \text{B. Enteritidis (Gärtner)} \\ \text{B. Paratyphosus A.} \\ \text{B. Paratyphosus B.} \end{array} \right\}$ | Ferment glucose with gas formation, but not lactose. |
| Colon group | $\left\{ \begin{array}{l} \text{B. Coli com varieties} \\ \text{B. Lactis aerogenes} \\ \text{B. Acidi lactici} \\ \text{B. Cloacae} \end{array} \right\}$ | Ferment both lactose and glucose with gas formation. |

Bacilli sub-cultured from plates to media containing lactose and glucose could be placed in their groups, as above indicated according to whether they produce gas. Then with the aid of a more analytical classification further differentiations could be made. Such a classification, depending on morphological, bio-chemical, and other differences, is now given.

TABLE "F."

| | | | |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ferment lactose (gas) | Non-motile | $\left\{ \begin{array}{l} \text{B. Lactis aerogenes.} \\ \text{B. Acidi Lactici.} \end{array} \right\}$ | |
| | Matile | $\left\{ \begin{array}{l} \text{B. Cloacae} \\ \text{B. Proteus} \\ \text{B. Coli Groups} \end{array} \right\}$ | $\left\{ \begin{array}{l} \text{Liquify gelatine.} \\ \text{Not liquify gelatine} \end{array} \right\}$ |
| Do not ferment lactose (no gas) | $\left\{ \begin{array}{l} \text{Cocci} \\ \text{B. Typhosus} \\ \text{B. Cholerae} \\ \text{B. Dysenteriae} \\ \text{B. Faecalis alkaligenes} \\ \text{B. Enteritidis} \\ \text{B. Hog Cholera} \\ \text{B. Paratyphosus} \\ \text{B. Vulgaris} \end{array} \right\}$ | | $\left\{ \begin{array}{l} \text{Do not ferment glucose (gas absent).} \\ \text{Ferment glucose (gas present).} \end{array} \right\}$ |
| | | | $\left\{ \begin{array}{l} \text{A. Groups. Typical to tests.} \\ \text{B. " Differ in one particular.} \\ \text{C. " Differ in two or more particulars.} \end{array} \right\}$ |

As a means of final identification, the bacillus must be examined in detail for its size and shape, motility, staining properties, presence or absence of flagella, nature of its growth in and on various media, its agglutination reactions and its pathogenic tendencies. In our investigation, the last could not be tested, but is added to complete the list.

METHOD OF INVESTIGATING FÆCES.

Eight-ounce jelly jars were cleaned and sterilized by hot air. Sterilized paper covers were then tied over their mouths. These jars were sent to the wards, the nurses having previously been instructed to see that selected patients passed fæces into the jars, without admixture of urine. The presence of urine, especially if the reaction becomes alkaline, inhibits the growth of certain intestinal bacilli. The fæces, as soon as possible, after their reception at the laboratory, were examined for:—

1. Size.
2. Form.
3. Colour.
4. Gross contents.
5. Odour.

These points were noted, and, if the stool was formed, it was mixed with an estimated equal quantity of cold, sterilized, distilled water, and stirred into a fluid consistence, with a sterile glass rod. At this time, the presence or absence of gas was determined—gas showing itself by bubbles floating on the surface. Very fluid stools did not need to be mixed with water. Three loopsful of the fæcal material were disseminated through 5 c.c. of broth, contained in a test tube. Then three loopsful of the sown broth were deposited on the surface of a Petri dish preparation of sodium, bile salt, lactose, peptone, neutral red agar (MacConkey), consisting of:—

| | | | | |
|----------------------------------|-----|-----|-----|-----------|
| Sodium taurocholate | ... | ... | ... | 5gm. |
| Peptone (Witte and Rostock) | ... | ... | ... | 20gm. |
| Agar | ... | ... | ... | 20gm. |
| Lactose | ... | ... | ... | 10gm. |
| Solution of neutral red (1 p.c.) | ... | ... | ... | 5c.c. |
| Distilled water | ... | ... | ... | 1,000c.c. |

The neutral red (Grubler) solution should be freshly prepared (20).

The three loopsful, placed on the medium, were spread over its surface by means of a sterile L-shaped glass rod. The medium was then incubated for 24 hours, at 37 deg. C. At the end of the time, coloured and colourless colonies were usually found. The red colonies represented lactose fermenters, which were, as a rule, disregarded, and were only of a negative interest in the search for a typhoidal bacillus. The lactose fermenters have recently been subjected to a close examination by MacConkey, to whose work a reference may be given (21).

It was often found that some of the colourless colony bacilli gave fermentation (gas) results when sub-cultured to lactose.

However, all colourless colonies were transferred by stab to lactose agar tubes, and incubated for 24 hours, at 37 deg. C. A solid lactose medium was used in preference to Durham's tubes (22), on account of the nature of the growth and character of gas production giving valuable

| Bacillus | Group | Group Characteristics | Morphology | Mo- bile | Gram | Liq. Gel. | Growth in Broth | Gelatine Colonies, &c. | Agar Slant, &c. | Litmus Milk | Indol | Litmus Whey | Potato | Neutral Red Agar | Glucose | Lactose | Mannite | Litmus, Nitroso, Lactose, Glucose, or Mannite |
|---------------------------|----------------------|------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-------------|------|--------------|-------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|----------------------------|------------------------------------------------------------|-----------------------------------------------------------------------------------------|---------------------|---------------------------------|-----------------|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| B. Typhosus .. | Typhoid .. | Do not produce gas in lactose or glucose. Do not clot milk, and pro- duce little or no acid | Bacilli 0.5-0.8 : 1.3 μ Fla- getta 8-14, long and undulate | + | - | - | Less than coli. Uniform turbidity. No scum | In 3 days show veil like furrowing | Thin greyish white and smooth | Little or no acid. No coagulation. H ₂ S | .. | Remains clear | Acid, slight growth. Alkaline yellowish | No fluorescence | Little (lactic) acid. No gas | No acid. No gas | No gas | L.N. Lactose - Unchanged 24 hours (C.F. colon) L.N. Glucose - Red (and coagulate) 24 hours (C.F. Dysentery) L.N.A. Mannite - Red (C. F. Dysentery) |
| B. Dysenteriae (Shiga) .. | | | Bacilli short. Ends rounded. Like Typhoid. Slow involution forms | - | - | - | General turbidity .. | Colonies sharply defined, yellowish, finely granulated. Never very flat as in typhoid | Agar colonies in 24 hours large, moist, glistening, brownish and translucent. Become larger and irregular | Alkaline and slight acid. No clot | .. | Remains clear | Scarcely visible, white dry growth, becoming reddish brown after some weeks | .. .. | Ferments, but no gas | No fermentation | No gas | L.N. Glucose - Unchanged 24 hours (C.F. Typhoid) L.N. Agar Mannite - Lower layer decolorized Upper layer unchanged (C.F. Typhoid) |
| B. Dysenteriae (Flexner) |  |  | .. .. | - | - | - | General turbidity .. | .. .. | .. .. | Alkaline or slight acid. No clot | .. | Remains clear | .. .. | .. .. | Ferments, but no gas | No fermentation | Ferments | L.N. Agar Mannite - Red (C.F. Shiga) |
| B. Bacillus Allagani .. | | | Bacilli Typhoid like. No spores | + | - | - | Scum. Broth clear, and often sedi- ment free | Gelatine stab, shows abundant growth along line | Agar colonies white, glistening, and not spreading | Never acid. Be- comes alkaline. No clot | Rarely, in old cultures | Alkaline .. | Variable .. | .. .. | No gas | No fermentation | No ferment | L.N. solution alkaline |
| B. Hog Cholera .. | Hog Cholera Group | Gas, with glucose, but not lactose | .. .. | + | - | - | General turbidity. Scum | .. .. | .. .. | Alkaline .. | Slight or nil | .. .. | .. .. | .. .. | Gas .. | No gas | Acid and gas | .. |
| B. Enteritidis .. | | | Short and thick. No endo spores | + | - | - | General turbidity .. | .. .. | .. .. | Alkaline .. | Slight or nil | .. .. | Greyish-white or yellow | .. .. | Gas .. | No gas | Acid and gas | .. |
| B. Paratyphosus A .. |  |  | .. .. | + | - | - | General turbidity .. | Circular colonies with no veil like markings as in typhoid | .. .. | Acid .. | Slight or nil | .. .. | .. .. | Fluorescence .. | Gas .. | No gas | Acid and gas | L.N. Glucose - Coagulated |
| B. Paratyphosus B .. |  |  | .. .. | + | - | - | General turbidity .. | Colonies thick, white and irrides- cent when young | .. .. | Alkaline and de- colorized | Slight or nil | .. .. | Brown stain .. | Fluorescence .. | Gas .. | No gas | Acid and gas | L.N. Glucose - Coagulated |
| B. Coll. Comm. .. | Galen Group | Ferment both lactose and glucose, with gas formation. Acid and clot in milk | Bacilli 0.4-0.7 : 1.3 μ | + | - | - | Rapid at 37° C., with turbidity | Colonies visible 24 hours. In 48 hours flat, pale brown or colour- less. Wavy margin and sur- face lines | Thick white growth .. | Acid and coagula- tion | + 4 to 7 days | Require 6-10 N p. c. - alkali 10 to neutralize | Pronounced greyish- brown growth | Fluorescence .. | Gas and acid .. | Acid and gas .. | Acid and gas .. | L.N. Lactose - Red, gas and coagulated 34 hours (C.F. Typhoid) |
| B. Lactis Aerogenes .. | | | Bacilli 0.5-1 : 1.0-2.0 μ . Short and thick with longer forms. No spores | - | - | - | Great turbidity. Abundant sedi- ment. Usually scum | Coli-like stab thick along line, and spreading on sur- face. Colonies become thick and white | Thick white glistening growth | Acid and clot. Milk cultures capsules | Usually - May be + | Acid .. | Thick yellow, with wartlike elevations | .. .. | Much gas and acid | Acid and gas .. | Also saccharose acid and gas | .. |
| B. Acid Lactici .. | | | Bacilli 0.5-0.6 : 1.2 μ Often in twos | - | + | - | General turbidity .. | Coli-like .. | White or yellow growth | Acid and clot. and alcohol | Co ₂ + | Acid .. | Yellowish-brown .. | .. .. | .. .. | Gas .. | Acid and gas | .. |
| B. Cloacae .. | | | Bacilli 0.7-1.0 : 0.8-1.0 μ . Short and oval. No spores | Very + | - | + | Turbid and scum .. | Colonies deep, round, and yellow | Porcelain growth | Acid and clot | .. | Usually + .. | Acid .. | .. .. | Acid and gas .. | Acid and gas .. | Acid and gas | .. |

information. In connexion with this, the caution recorded by Durham (22). in his communication, was not forgotten. All non-lactose fermenting growths were sub-cultured by stab from the lactose agar tubes to glucose agar tubes, and incubated (24 hours, 37 deg. C.). During the incubation of the medium last mentioned, the bacilli were taken from the lactose tubes, and examined for morphology, motility, staining properties, and agglutination reactions. The production or non-production of gas, in the glucose tubes, divided the organisms into the Hog cholera group, and the typhoid and streptococcal groups. (See Classification Tables.) Suspected bacilli (glucose fermenters and non-glucose fermenters) were put through their facings, by further sub-culture, to the following media:—

1. Broth—for growth (turbidity, scum, sediment, &c.).
2. Broth—for indol formation.
3. Gelatine stab for growth and liquifying properties.
4. Gelatine slant—for growth and liquifying properties.
5. Gelatine plate—for colonies.
6. Agar slant—for growth.
7. Litmus milk—for acid and clot.
8. Litmus whey—for acid and turbidity.
9. Potato (non-acid)—for growth.
10. Neutral red—glucose—agar—for fluorescence and gas.
11. Lactose agar—for gas production.
12. Glucose agar—for gas production.
13. Mannite agar—for gas production.
14. Litmus nutrose glucose—for acid and coagulation.
15. Litmus nutrose lactose—for acid and coagulation.
16. Litmus nutrose mannite—for acid and coagulation.
17. MacConkey's slope—for growth and colour.
18. Voges and Proskauer reaction (*B. cloacæ*, *B. lact. ærogenes*)
for eosin-like fluorescence.

If thought necessary, further microscopical examination was made, and the results, together with those of culture, were compared, and the bacilli identified, if possible.

In our investigation, as mentioned elsewhere, Drigalski-Conradi media, Endo's media, and caffeine broth, were used; but the bile-salt media were found most useful, and became a stand-by in the methods adopted. To the inquirer, details of all the media mentioned must be looked for in a recognised laboratory handbook (23).

Up to date examinations of fæces of thirty patients, likely to reveal a specific pathogenic organism, have been made. Only in one instance has a bacillus, giving all the characteristics of typhoid type, been isolated. This bacterium was found in the fæces of a girl, who had had typhoid nine months previously. Three months afterwards, an investigation of her fæces was made with negative results. On no occasion was a paratyphoid bacillus found, although organisms of the hog cholera group have been isolated. The pathogenic significance, if any, of these could not be determined with the facilities at our disposal. When a carrier is found, the only way to prevent likely spread of infection is to isolate the individual, as far as practicable, and treat all excreta by incineration. In our case, the patient was sent to a ward containing old and infirm women. Her youth made her conspicuous and easy for constant observation. Her habits were regulated, as far as possible, and her fæces and urine burned

in an incinerator as soon as passed. Special attention was paid to her personal hygiene, *disinfection of her hands being an important point*. She slept in a room to herself, and all soiled linen, in common with that in the whole asylum, was immediately placed in liquid disinfectant. Intestinal disinfection was not adopted. It would have tended to prevent later faecal examinations for research purposes, and would probably have been useless, as a preventive means, and caused us to place too much reliance on an unimportant measure. It cannot be proved whether this individual was a source of infection or not, but to set about to discover carriers, and to adopt necessary precautions, seems to be a proceeding tending towards safety, to say the least.

In conclusion, it must be pointed out that typhoid is not an unlikely possibility in any asylum, and that, once having occurred, most stringent precautions must be taken to prevent its spread, both during the active period of the disease, and also after the acute manifestations have passed.

It now only remains for the writer to extend his thanks to Dr. Jones and Dr. Barker for providing the facilities that made an investigation into this matter possible, and to acknowledge the kindly interest taken, and the many useful suggestions made by Dr. Mackeddle.

A list of references follows:—

LIST OF REFERENCES.

- (1) *American Journal of the Medical Sciences*, April, 1907, p. 653
- (2) *American Journal of the Medical Sciences*, May, 1906, p. 932.
- (3) *American Journal of the Medical Sciences*, July, 1906, p. 166.
- (4) *Lancet*, 12th October, 1907, p. 1035.
- (5) *Lancet*, 12th October, 1907, p. 1036.
- (6) *American Journal of the Medical Sciences*, April, 1907, p. 655.
- (7) *American Journal of the Medical Sciences*, May, 1906, p. 932.
- (8) *Lancet*, 23rd February, 1907, p. 526.
- (9) *American Journal of the Medical Sciences*, May, 1906, p. 932.
- (10) *American Journal of the Medical Sciences*, June, 1907, p. 896.
- (11) *Lancet*, 4th May, 1907, p. 1241.
- (12) *American Journal of the Medical Sciences*, February, 1907, p. 319.
- (13) *Lancet*, 18th May, 1907, p. 1363; and *British Medical Journal*, 18th May, 1907, p. 1183.
- (14) *American Journal of the Medical Sciences*, February, 1907, p. 319.
- (15) *American Journal of the Medical Sciences*, November, 1906, p. 809.
- (16) *American Journal of the Medical Sciences*, July, 1906, p. 109; and *Journal of Hygiene*, Vol. 5, p. 429, *et seq.*
- (17) *British Medical Journal*, 14th June, 1902, p. 1433.
- (18) *Journal of Hygiene*, Vol. 6, p. 35.
- (19) *Lancet*, 19th January, 1907, p. 163.
- (20) *Journal of Hygiene*, Vol. 5, p. 334.
- (21) *Journal of Hygiene*, Vol. 5, p. 333, *et seq.*
- (22) *British Medical Journal*, Vol. 1, 1898, p. 1387.
- (23) *Abel's Laboratory Handbook of Bacteriology* (Gordon trans.).

DYSENTERY: AN ACCOUNT OF ASYLUM DYSENTERY IN
THE HOSPITAL FOR INSANE, PARRAMATTA, NEW
SOUTH WALES, IN THE YEARS 1906-7-8.

DR. G. PRIOR,
Senior Medical Officer of the Hospital.

Dysentery occurred in the Hospital for the Insane, Parramatta, in December, 1903, and January, 1904, in which epidemic there were 42 cases in the male division, of which 9 died. In the weatherboard division there were 12 cases, of which 3 died; and in the female side there were 25 cases, of which 9 died.

An account of this epidemic has been given by Dr. Moffit, and will be found in Vol. I., Pt. II., page 29, of the Reports of the Pathological Laboratory of the Lunacy Department.

Since that time the disease has constantly been recurring, and the hospital has not been without the disease for more than a few months. From September, 1904, to the end of that year there were five cases. During 1905 there were seven cases. It was from a case of the first epidemic that Dr. Flashman isolated a bacillus resembling the Shiga bacillus.

1906.

In 1906 there occurred twenty-one cases of dysentery, all in the male division of the hospital, the first case being reported early in June, and the last one in November.

Of these twenty-one cases, seven died. Of these seven, four were old, feeble men over 70 years of age, another two were over 60 years of age, and the youngest was 42.

One old man was ill for only six days, another for nine days, and another for ten days; one patient lingered on for five months, and then died from exhaustion.

Seven of these twenty-one cases had been in the institution under one year; two of them under two years; and three, under three years; while nine cases had been in the institution over three years.

1907.

There were no more cases of dysentery until April 5th, 1907, during which month five patients were attacked, four from Ward IV., and one from Ward V., all five of whom died, three of them being over 80 years of age, and another, aged 47 years, was blind and feeble. The next appearance of the disease was on 5th August, when a patient in Ward V. was reported to be ill with it; and on 16th September there were two more cases, one in Ward V., and one in Ward IV., and the institution was not without cases from them until April, of 1908.

During 1907 there were thirty-three patients attacked, the greater number coming from two wards—there being eleven cases from Ward IV., and ten from Ward V.

Of the thirty-three cases, fourteen had been in the institution under one year; three under two years; three under three years; and thirteen over three years. Eleven of these patients died from dysentery in periods varying from four days to two months, two dying within seven days, and another after eight days, illness. Three of these were over 80 years of

age. two others over 60, the oldest man who died being 93, and the youngest 28; the latter was a strong and healthy man, had a severe attack, and died after a month's illness. Twenty-two cases recovered, two of whom have since died of phthisis. One at the time he contracted dysentery was a strong and healthy man, æt. 32, who had a very severe attack, became very thin and weak, and developed phthisis at this time, and died within three months. The other case had phthisis previous to dysentery.

1908.

In 1908, there were eighteen cases of dysentery, from 7th January to June, these cases being continuous with those of 1907. During this time all the cases but one were from either Ward IV. or V., which wards have all along been the chief sources of infection, especially Ward IV.; one exception was a case that was in Ward II. by day, slept in Ward VIII. at night, and was obliged to pass through Ward IV. to and from his bed.

Of these eighteen cases, seven died in periods ranging from three days to two months; again it was mostly in the old and feeble, all but two of the patients being over 60, and one over 90 years of age. Of the two exceptions one was a general paralytic in the third stage, æt. 36; the other was a man æt. 44, suffering from acute melancholia. As to the length of time resident in hospital, ten had been in under one year; two under two years; three under three years; and three over three years.

STAFF.

From the year 1905 to 1908 no member of the staff attending upon the dysentery patients contracted the disease. One attendant, who had had dysentery in the first epidemic, had during this time two recurrent attacks. This man was not personally engaged nursing dysenteric patients.

Two infants, members of the homes of two attendants who were nursing dysentery cases, were at this time attacked with diarrhœa characterized by the passage of blood and mucous from the bowel. One of the children died. Both attendants believed they had carried the infection home from the institution.

Taking the three years—1906, 1907, 1908—of the seventy-two cases of dysentery, thirty-seven, or rather more than half, arose in the ward known as IV., and fifteen in Ward V. The cases in Ward V. occurred in the last two years of the epidemic, there being no cases in V. in 1906.

It is therefore seen that these two wards—IV. and V.—and more especially the former, are the chief sources of infection.

In what way do these wards differ from the others in this hospital?

Ward IV. has an airing court attached, which is closed in on all four sides, and which is partly sheltered from the winds, and does not get the full force of the sun. It usually contains from 90 to 100 patients, who are mostly old, feeble, and demented; and a great proportion of them are wet and dirty in their habits.

This ward is also the admission ward for the old and weak men, a fair number of whom are received here from the Asylum for the Infirm. It has a special hospital ward attached. Its sleeping accommodation consists of three dormitories on the ground floor, thrown into one; there being no doors between them. These dormitories contain fifty-six patients, and have a cubic capacity of 33,813 cubic feet, and are known as Nos.

I. and II. Observation Wards, and as the W. and D. It is in these three wards and the hospital ward that the patients from Ward IV. who had dysentery were sleeping. They are all well ventilated, having windows on both sides and open trellis doors. Pan closets, ventilated into chimneys, are in the wards, and are emptied once or twice during the night. In spite of good ventilation and care with the closets, what Dr. Knobel calls a "privy odour" (which he truly says it is impossible to entirely prevent where there are many patients of dirty habits) is of necessity at times present in these wards.

Ward V. is where the criminal insane are under care. It contains two light and airy courts, although walled in all round. Its sleeping apartments consist of three stories; the ground floor being entirely divided into single rooms, and the corridor between affording sleeping accommodation for from ten to sixteen patients in a cubic capacity of 12,954 feet. This ward is not so well ventilated as Ward IV., there being only windows on either end, and on one side opening on to a verandah. It also, as all the wards do, contains an open closet.

A point of interest as regards these cases is the high percentage of recent admissions which are attacked with dysentery. Of the seventy-two cases now being considered, twenty-five only had been in the institution over three years, sixteen had been in over one year, and under three years, while thirty-one cases were attacked within the first twelve months of their admission. The average number of male patients admitted per annum during the period under review, is about 135, while the average number under care per annum is rather more than 900.

This looks as if the longer a patient resided in hospital the less likely he is to suffer from dysentery, and as if length of residence rendered him more immune from infection, or, as if some contributing cause had less effect upon him.

Fifty-two cases having come from the two wards, which evidently for some reason are the centres of the disease, the question arose, could the other twenty cases be connected directly or indirectly with these centres of infection. In 1906 there were four cases from Ward II.

On 1st November, a patient, who was in Ward II. by day, and slept in Ward IV., contracted dysentery. On 7th November, there were two cases in Ward II., another on 8th November, and it is probably reasonable to connect these three with the case that occurred on 1st November, though this, according to Sandwith, gives a rather long incubation period. The insane, as is well known, are often ill some days before the disease is observed.

The other case in Ward II. occurred on 11th June; there was one in IV. on 5th June, another on 11th June, but the case cannot be directly associated with either of these.

Neither can the source of infection of the two cases in III., or of that in I., be directly traced. Dysentery existed in wards around them, and the man from Ward I. was working on the farm, and may have handled night-soil.

In 1907, there were four cases from Ward III.; the first patient was attacked on 20th October, and was sleeping in Ward VIII.; to get to his room he had to pass through Ward IV. Ward VIII. consists of a corridor

with single rooms on either side. Here the dirtiest patients are located. The windows on one side open on to the verandah of Ward IV.; they receive no sunlight, and a "privy odour" is always present. This patient returned to his ward convalescent on 10th November. 16th November and 22nd November were the dates of the next two cases. It is possible that the first case was only apparently cured, and infected the other two. The next case occurred on 30th December; he also slept in Ward VIII., and was attacked six days after the case of 22nd November returned to his ward.

Of the four cases from Ward I. (which is the ward which contains the convalescent and the quiet chronic patients), the first had been in this ward twenty-six days, having previously been in Ward II. by day, and in Ward IV. by night. This man had had two previous attacks, one in the first epidemic in 1904, the other outside the institution. The next case had been in Ward I. only fourteen days, having come from Ward II., where there had been a case five days before he was transferred. The third case had been in this ward for two months; and the fourth for five days—both having come from a ward which was then free from dysentery.

But at this time, however, one of the first two cases of the epidemic had returned to Ward I., and had been there three and ten days respectively before the latter two were taken ill.

Of the three cases from Ward II., the first, occurring on 4th October, cannot be connected with the others. The second on 19th October was sleeping in Ward I., and was taken ill about the time of the cases from that ward. The other case occurred on 11th December, in an aboriginal, who was working in the grounds, but who came into no direct contact with the other cases. The patient from the weatherboard division was entirely isolated from the others.

In 1908, all the cases except one were from Wards IV. and V., and this patient slept in Ward VIII., which, as mentioned before, is adjacent to Ward IV. This leaves but eight cases which cannot be proved to have had more or less direct contact with previous cases, but considering that all the wards, except Wards I. and W.B., opened into one another, and that many patients from different wards mixed together at night and at work, the infection may have been carried by this means.

SECTION OF NAVAL AND MILITARY HYGIENE.

MEDICAL SERVICES IN WAR.

By SURGEON-GENERAL W. D. C. WILLIAMS, C.B.,
Director-General A.M. Services of the Commonwealth.

To enter into every detail affecting this complex organization could not be attempted, but I will endeavour to place before you some of the most important points, and emphasize what a highly organized, well-trained, and efficient medical service really does mean to the general well-being of an army in the field, and to ultimate success in a campaign.

Let us consider some of the main factors which govern the organization of a "Medical Service," and which at once comes into action as soon as troops are mobilized for war.

- (1) The general health and physical condition of the troops, and recommendations as to general and personal sanitation, clothing, &c.
- (2) The prevention of disease as far as may be practicable, or rather the avoidance of disease, if such be possible, or the early stamping out of an epidemic, should one arise.

These are factors overlying all modern ideas of sanitation for an army in the field.

Under this heading comes—

- (a) The selection of healthy and suitable camping grounds, examination, testing, and instructions, to insure a pure and ample water supply, regulation of foods and diets.
- (b) Rapid and safe disposal of all waste products of men and animals, and the thorough destruction of all refuse.
- (c) The early segregation of any affected with infectious and contagious diseases.

All the above items come under what may be termed the "prevention of disease," by far the most grave question the medical services have to face in any campaign, and which has only lately received that attention, which is of such vital moment.

A well shot-at army may be temporarily demoralized and recover itself; but an army into which disease enters, and progresses by leaps and bounds, has but a poor chance.

So much for prevention of disease. Now, another factor is the reception, treatment, care, and transport of the sick and wounded of the army, and to successfully carry through a campaign the multitudinous, and often unforeseen, requirements which come under this heading demands an organization of the highest order, and a wealth of resource, which is really difficult to estimate.

How different are the conditions in civil life! A telephone ring, a rubber-tyred ambulance, splendid hospital accommodation, and every requirement of science to hand. Contrast this with what is required from

a medical service in the field. A bare complement of *personnel* and transport, sometimes not even that, heavy and fatiguing marches, a fight—and the medical units working from dark to early morn, bringing in and treating wounded, and forwarding them on towards the dressing station or main tent division of a field ambulance—casualties in their own ranks, and a move on in the morn, with hardly time for meals, and none for rest—fighting and marching—casualties increasing and transport weakening, anxiety over the supply of medical and surgical stores, and so on, until it seems a wonder how the service can hold together at all; and be of any practical value. This is only a brief sketch, but a true one.

All medical arrangements of an army in the field are under the control of a Director of Medical Services (who was formerly termed P.M.O. Field Army).

The Director of Medical Services, in addition to his own staff, is assisted by administrative medical officers, senior medical officers of brigades, medical officers in charge of units, medical officers attached to regiments and corps, and the army nursing service.

When the organization of the medical services for an army in the field is examined, it will be found that provision has to be made for the conduct of the following units:—

- (1) The regimental medical service, comprising the medical officer attached to the regiment, his orderlies, and trained stretcher-bearers, with the regimental medical field equipment, and men attached for water duties.
- (2) Field units—
 - (a) Mounted troop field ambulances.
 - (b) Field ambulances.
- (3) Line of communication and base units comprising—
 - (a) Clearing hospitals.
 - (b) Stationary hospitals.
 - (c) Sanitary sections and sanitary squads.
 - (d) General hospitals.
 - (e) Ambulance trains.
 - (f) Hospital ships.
 - (g) Army nursing service.
 - (h) Base and advanced depôts of medical stores.

Sanitary Sections.—One sanitary section to each base and head of each railway. It comprises a technical staff, and men from the medical services, who supervise all matters necessary to secure a healthy environment for troops.

The sanitary section will be responsible to, and under the orders of, their respective commandants.

Not any combatant troops are employed in sanitary sections. The aim of the section is *prevention* of disease, and the responsibility for sanitation is now concentrated in the commanding officer, who is alone responsible to higher authority. He acts on advice of sanitary officer.

Sanitary Squads.—One sanitary squad to each railway post on line of communication, and two to each advanced depôt of medical stores. The sanitary squads are attached to sanitary sections as ordered, and their mobilization is carried out by officer commanding sanitary sections.

Regimental Sanitary Squads.—Supply of pure water and latrine supervision.

The essentials for the successful conduct of a medical service in the field are, that it should be under one command, and thus self-controlled, possess its own transport, capable of rapid mobility and extreme subdivision, possess adequate and trained reserve, and ample reserve equipment, &c.

Disposition in action, of a field ambulance—

The normal distribution is as follows:—

- (1) The bearer division ("A," "B," and "C" sections) has three subdivisions, each consisting of one officer and six stretcher squads, each squad having six men in it.
- (2) The ten ambulance waggons.
- (3) The dressing station (usually one subdivision of tent division).
- (4) Remainder of unit, with transport and baggage.

As the action opens up the officer commanding the unit will push forward with the *personnel*, &c., necessary for the dressing station, leaving behind, in a site from which they can be immediately moved up towards the front, if required, the remainder of the tent division, with its transport.

The bearer division, with its ambulance waggons, is advanced. A rendezvous for waggons is determined, to take over the wounded from the stretcher-bearer squads. Dressing station pitched, and everything made ready for the reception and treatment of wounded.

Scene of Action.—Let us now follow the career of a soldier from the time he is hit until an ultimate recovery, assuming the case to be a serious one, in order to illustrate the several stages through which he has to pass, and to realize how complete must be the organization and working of the service, in order that not any block in the official machinery may eventuate.

In the course of a rush from one point of cover to another, the bullet finds its billet, and the man drops. His first action, if he were able to do so, would be to apply his first field dressing, and either lie still, or crawl to cover, if close at hand, and await events. He is then attended to, as chance favours, by the medical officer of his unit and his own regimental stretcher-bearers, who hand him over to the bearer division of the field ambulance, who remove him on a stretcher, unless he is able to walk, to the ambulance waggon rendezvous, and on thence in these vehicles to the field ambulance dressing station, which may, or may not, be part or whole of the tent division.

Should, however, further treatment be required, more than the dressing station or the tent division can afford, he is moved on to the clearing hospital (Imperial 200 beds—local 100 beds), in one of the ambulance waggons, and from this to the stationary hospital on line of communication, either by train or wheeled transport. Still further treatment being necessary, the wounded man is carried on nearer to the base, to a general hospital of 520 beds, by an ambulance train, which will accommodate 100 lying down, and finally, if not recovered, the next move would be to a hospital ship, in the event of an oversea campaign, and from this ship he is sent to a hospital in his native land; and when at last cured, he reports at his *dépôt*, and is either given sick furlough, or rejoins his corps.

Proportion of Wounded in an Action.—Staff Surgeon Schafer, attached to the Russian army in Manchuria, estimated that the actual number of wounded would not be approximately higher, but often concentrated into masses of wounded, from rushes from cover, entrenchments, &c. At the battle of Mukden there were 36,000 wounded, of which 45 to 66 per

cent. returned to ranks under four months. On the other hand, many wounds were very severe. Amputation, however, was only performed 0.5 per cent., or 1 in 200. It was stated that two-thirds of wounded can retire on foot.

Clearing Field of Action—Time required.—The following calculations recently published by a professor of the general staff of Russia are of great interest on this important matter.

With a supposed total loss of 25 per cent., the proportionate numbers of killed, slightly wounded, and severely wounded may, as experience shows, be taken as—

| | Per cent. | Force, 2,000, Inf., i.e., 2 Regts. Inf., each 1,000 |
|------------------|------------|--------------------------------------------------------|
| Killed | ... 5 ... | ... 100 |
| Slightly wounded | ... 13 ... | ... 260 |
| Severely wounded | ... 7 ... | ... 140 |
| | 25 | 500 |

Some may say that 25 per cent. is too high a basis; but at the battle of Shipka Pass this was about the percentage.

Anyhow, if reduced to $12\frac{1}{2}$ or 15 per cent., it must mean a heavy strain and demand on medical *personnel* and transport.

The necessity for a much increased number of ambulance waggon, or adequate transport for wounded, capable of being massed and utilized close to the scene of action, has become most apparent, otherwise delay in dealing with the wounded must occur and much suffering produced.

Training for War.—For any medical service to be efficient and complete in time of war, entails the highest training in the time of peace, and such training must start from a methodical base, and be progressive in form. This most especially applies to officers and non-commissioned officers, and the commanding officer of a field ambulance, whether for mounted troops or infantry, is the sole responsible instructor for those under him, and to higher authority must render an account of the efficiency of his unit. When one considers for a few moments the multitudinous items involved in the training of a medical unit, it is impossible not to realize how thorough this must be to insure high efficiency. First aid, stretcher and waggon exercises, driving, and care of horses, camp pitching and routine, nursing of patients, compounding of drugs, sick cooking, &c., it is no small field of items, each of which demands earnest attention to obtain first class results.

Unless peace training be thorough, and a trained reserve of *personnel*, officers and men, and also an adequate reserve of equipment, transport, and medical comforts be available, war break-downs are inevitable. History has repeated itself time after time on this measure.

With these few remarks on training, let us proceed to the next, an extremely important point, "the expansion of the medical services from a peace to a war footing."

Expansion—Peace to War.—In this, we have at once to deal not only with conditions which do not exist in peace, such as clearing hospitals, hospitals on lines of communication, and in fortress districts, ambulance trains, advanced and base depôts of medical stores, and also general hospitals at the base, with the items of equipment and transport necessary for these units; but also the question of *personnel*—both officers and men.

No nation could be expected to keep its medical services completely equipped for war, on its military vote; but a great deal can be done during peace, that the units may be so organized that the necessary war expansion can be carried on rapidly and efficiently.

For this purpose a reserve of medical officers and other ranks is absolutely essential—and it must be a trained reserve capable of fulfilling the duties allotted to them—not an improvised mob, which so many seem to think can be run in at the last moment and made available for medical duty. Every year the greater will be the demands made on medical services, both from a scientific and sanitary dealing with troops in the field, and *pari passu* a higher standard of efficiency will be needed.

To meet these conditions, an organization for an Australian Army Medical Corps Reserve has lately been gazetted. It is organized on the following lines:—

AUSTRALIAN ARMY MEDICAL CORPS RESERVE.

1.—*Object.*

The formation of an Australian Army Medical Corps Reserve has been approved for the purpose of providing the medical and surgical staffs, both consultant and executive, for the treatment in time of war of sick and wounded of the Military Forces of the Commonwealth, in such Government and civil hospitals as may be arranged with, and also to provide from those who have received the special requisite training, the additional *personnel* required for light horse field ambulances, field ambulances, and other medical units.

2.—*Constitution.*

The Australian Army Medical Corps Reserve shall be composed as follows:—

Officers—

- (a) Those already on the Reserve of Officers, Commonwealth Military Forces List.
 - (b) Duly qualified and registered members of the medical profession willing to be enrolled in the Reserve, and recommended by the District Principal Medical Officer.
- These members (b) will be graded as follows:—

- (1) Consultant Staff.—(2) Executive Hospitals Staff.—To form the medical and surgical staffs for the various Government and civil hospitals to which sick and wounded would be sent for treatment.
- (3) Duty with Field Force and Garrison Troops.—To any Australian Army Medical Corps Units as determined.

Other Ranks—

- Students of medicine.
- Chemists and chemists' assistants.
- Members of recognised Ambulance Societies.
- Special trades.

3.—*Commissions in Australian Army Medical Corps.*

During peace time duly qualified and registered members of the medical profession enrolled in the Reserve may also be granted commissions in the

Australian Army Medical Corps, and transferred to the Reserve of Officers, Commonwealth Military Forces, on compliance with regulations 57, 58, and 63 for the Military Forces of the Commonwealth.

4.—*Age for Retirement.*

The provisions of Commonwealth Military Regulation 134 will apply to all ranks of the Australian Army Medical Corps Reserve, viz.:—Officers A.A.M.C. Reserve, 60 years. N.C.O.'s and men, 60 years.

5.—*Service.*

In time of war or in case of necessity all members of the Australian Army Medical Corps Reserve may be called out for military service.

6.—*Pay (when called up for Service or Special Duty).*

1. Officers of the Reserve who have previously held commissions in the Australian Army Medical Corps—in accordance with financial and allowance regulations.

2. Civilian medical practitioners enrolled in the Reserve—as may be specially laid down.

3. Other ranks—as for ranks Australian Army Medical Corps.

7.—*Uniform.*

Not required until mobilized, but officers may wear undress uniform of A.A.M.C., with the word "Reserve" in gilt metal letters on shoulder-straps.

8.—*Instruction.*

The Schools of Instruction for the Australian Army Medical Corps, held periodically in the various States, are open to all members of the Australian Army Medical Corps Reserve, provided that this instruction and attendance entail no extra expense to the Commonwealth.

ADDITIONAL NOTES.

1. Every officer of the A.A.M.C. to be communicated with, so that he may be in a position to advise and obtain members, and assist in the movement.

2. Enrolment of members other than officers should be confined to localities where there is an A.A.M.C. Unit, unless the locality is sufficiently near to enable them to receive instruction, without any expense *re* travelling being incurred.

3. The principle to be kept in view for the present, outside consultant and executive hospital staffs, *vide* pars. 1 and 2 before mentioned, should be to enrol members capable of bringing the peace establishment of A.A.M.C. Units up to the war establishment laid down.

4. Honorary ranks will be granted to members of the medical profession on appointment as follows:—

(1) Consultant staff and consultants—honorary rank of major.

(2) Executive hospital staff—honorary rank of captain.

(3) Duty with Field Force and Garrison Troops—honorary rank of captain.

5. A syllabus of instruction has been prepared, and will be issued.

6. The Minister is extremely anxious that this movement be pushed on with every energy.

7. A form (D. 20) of attestation has been approved, and copies may be obtained from District Head-quarters.

There is only one word which fully designates what an improvised medical service means, sad but true, and the word is "disaster."

To trust the treatment, care, and transport of sick and wounded to medical units, improvised in a hurry, at the most only partially trained, and destitute of the special knowledge required, is nothing short of man-slaughter.

One of the most popular fallacies, even amongst those who should know better, is that a medical service can be improvised at the last moment. The cry is, "Don't worry about it till then, the doctors will get along all right, &c., &c." What a mistake this is only those know who have to administer and command such a service, and even those more unfortunate, viz., the sick and wounded, under whose care and treatment they may by mischance happen. No one is quicker to recognise an efficient service than the sick man interested.

Tactics.—That all senior medical officers in the field should possess some tactical knowledge as to the operations of troops in the field is essential, and they should be able to grasp and appreciate the dispositions and movements of troops, and the ultimate object in view. To enable them to make these appreciations, it is necessary that those in command should give their director of medical services some idea of what they intend to attain before an action is entered into, such as the length of front, positions to be held, and those to be forced, time of attack and possible period of duration, nature of reinforcements, if any, and subsequent movements.

Both Generals Sir Ian Hamilton and Sir Archibald Hunter invariably sent for their P.M.O. before any big action was commenced, and explained what were their intentions—the extent of front to be occupied, the results expected, and future movements, as far as could be foreseen. The P.M.O. was, therefore, able to plan out beforehand a concise disposition of the medical units, and bearer companies were brought up into positions from which they could render prompt assistance when needed, the sites for dressing stations and field hospitals could be determined to the best advantage, arrangements made for transport to a stationary hospital in rear, for all the sick and wounded, and the forward movement of the bearer companies and field hospitals, with their respective brigades, made a matter of prompt assurance. The value of this previous information was inestimable, and it would be well in our peace manœuvres if the officer commanding troops would make clear his intentions in any operation intended to the officer in charge of the medical service, and much instructional value can be gained thereby.

I remember having heard on one occasion, when, during continuous training, an attack on a position was part of the programme, that the P.M.O. inquired as to some details as to the movements and positions to be taken up by the attacking force, to which he was attached, he was informed in a solemn whisper "everything was confidential."

That a grave responsibility is thrown on the medical services in war admits of no doubt, a responsibility for the lives and health of all ranks, and a responsibility towards the actual fighting power of an army. A sick army cannot fight, and the more fit and healthy men are available day by day to carry out a campaign, so much easier will be the task of

the general in command. It therefore behoves those in authority to afford every assistance during peace for the maintenance of an efficient *personnel*, equipment, and transport for medical services, and also for its prompt and efficient expansion to war.

DISCUSSION ON SURGEON-GENERAL WILLIAMS' PAPER.

SURGEON-GENERAL SKERMON outlined the medical services in New Zealand. The improvised medical service broke down badly in South Africa. He considered nothing so important as a full and proper training for war in times of peace.

MAJOR BICKLE considered that medical services should have a special and distinctive uniform, so that they could not be mistaken for combatant forces.

CAPTAIN C. SALMON and CAPTAIN SUTHERLAND also discussed the paper.

SYPHILIS IN THE ROYAL NAVY ON THE AUSTRALIAN STATION.

J. FALCONER HALL, Fleet Surgeon, R.N.

H.M. Navy on this Station is represented by ten ships, viz., one first-class, three second-class, and five third-class cruisers, and a surveying ship, as well as the naval establishment at Garden Island, Sydney. The complement of officers and men is 3,063.

The following statistics of the prevalence of syphilis in H.M. Navy on this Station are compiled from Sunday returns of the sick on board each ship on that day, which are sent to the flagship. I may not have got every case, but I feel certain I have nearly done so.

The figures in this return are from the 1st of January to the 31st of August, 1908, as previous to this year no note was made on the Sunday return where venereal diseases were contracted.

From 1st January to 31st August 53 cases of syphilis have been contracted on this station. viz. :—

- 42 cases, or 79.24 per cent., at Sydney.
- 6 cases, or 11.32 per cent., at Hobart.
- 2 cases, or 3.77 per cent., at Melbourne.
- 1 case, or 1.88 per cent., at Fremantle.
- 1 case, or 1.88 per cent., at Christchurch.
- 1 case, or 1.88 per cent., at Tahiti.

Thus, in Sydney, you will see that there are almost four times as many cases contracted as there are compared with the whole of the rest of the Station. No doubt it may be said that as Sydney is the head-quarters of the fleet, that the ships spend more time there than elsewhere on the Station, but that is not so, as the average stay of each ship at Sydney very rarely exceeds three months a year.

I will quote the remarks made by the Naval Director General in the Statistical Report of the Health of the Navy for the year 1906 :—

“ *Venereal Diseases.*—The case ratio on the Australian Station under this heading was 214.75 per 1,000, an increase of 58.57 as compared with last year. and of 56.73 in comparison with the average ratio for the last nine years. Sydney is mentioned by

nearly all medical officers as the place where these diseases are most prevalent, and, during the year, inquiries were set on foot to devise measures to check this pest in this port. It is worthy of note that Brisbane, where apparently a modified Contagious Disease Act is in force, is noted as being practically free from these diseases; and the medical officer of the *Pegasus* reports that at Noumea, where the French authorities rigidly enforce a Contagious Disease Act, not a single case was contracted, although leave was freely given to the crew during all the days of the visit of the ship to this port."

To return to the cases for this year, Hobart comes second with six cases, all being contracted while the fleet were there during the early months of this year. I think this is too high a return, as, in two cases I had in the *Powerful*, the men told me that they got the disease from women who had followed the fleet from Sydney to Hobart, and it is quite possible that the other cases might have contracted the disease from Sydney prostitutes paying a visit to Hobart. My own two cases already referred to, I returned as contracted at Sydney, and rightly so, I consider.

Hobart, as you probably know, has a modified Contagious Disease Act.

None of the other ports require any special notice, as their percentage is very small.

TREATMENT OF SPECIFIC CASES ON BOARD SHIP.

As soon as the case is diagnosed, the serious nature of the disease is explained to the man, and he is told he will be under treatment for at least two years before he can expect to be cured.

The man is taken out of his ordinary mess, where he might infect others, and placed in the so-called "medical mess," in which all the members of it are suffering from syphilis, and are undergoing continuous mercurial treatment.

Men in the medical mess must be clear of all active symptoms of this disease for three months before they are allowed ashore, and must be clear of all active symptoms for two years before they are allowed to pass from the medical to any other mess. At present, out of a ship's company of 753, I have 37 cases in two medical messes, undergoing continuous treatment.

Personally, I usually use hyd. c. creta and mist bin-iodide, though in severe cases I have used the intra-muscular injections; but only with men on the sick list, as I do not consider it safe to send a man to work immediately after receiving an injection. On board ship, there is no difficulty in getting the men to attend regularly for treatment.

In every case, there is a note made on the man's medical history sheet; if on the sick list in the usual columns; if on the attending list I fill on the top of the sheet the total time he has been under continuous treatment, so that in the next ship he goes to the medical officer can follow the history of the case.

In 1906, on the Australian Station, 4,340 days was the total sickness due to syphilis primary and secondary. This, to me, seems a frightful waste of the fine material that the Royal Navy supplies to this Station.

From what I have quoted from the Health of the Navy, and my own figures, I am perfectly certain you will quite agree with me that drastic steps ought at once to be taken to prevent the spread of this awful disease, not only for the good of humanity, but also, as far as the Navy is concerned, to save the wastage through invaliding, and the loss of time and money incurred by the Government during the time these men are on the sick list, with a disease that ought to be easily prevented.

RATIO PER 1,000 OF STRENGTH.

| — | | Cases. | Invalided. | Daily Sick. | — |
|-----------------------------------|----|-----------|------------|-------------|-------------------------------------------------------------------------------|
| | | per cent. | per cent. | per cent. | |
| Syphilis Pry. | .. | 17.84 | .. | 1.08 | } Australian Station, 1906 Average strength, 3,250 |
| .. Sec. | .. | 47.07 | 0.61 | 2.57 | |
| Syphilis Pry. and Chan- croids | | 37.68 | .. | 2.38 | } Australian Station, average ratio for the nine years 1897 to 1905 |
| Syphilis Sec. | .. | 35.01 | 1.63 | 2.43 | |
| Syphilis Pry | .. | 17.45 | 0.09 | 1.5 | } Ratio per 1,000 of the whole Royal Navy. Average strength, 108,190 |
| .. Sec. | .. | 29.14 | 1.5 | 2.64 | |

DISCUSSION ON PAPER BY FLEET SURGEON HALL.

COLONEL THOMPSON, V.D., was pleased to note Fleet Surgeon Hall's remarks as to the disease in Brisbane, as he was strongly in favour of the Contagious Disease Act there in force. Only half the prostitutes were ticketed, and these were examined every fourteen days. He found men of local forces glad to be properly treated. The percentage of syphilis in permanent military forces in Brisbane and Lytton for the past twelve years was 2.3 per cent. of strength, and percentage of gonorrhœa was 10.75 per cent.

MAJOR A. WATSON remarked upon the advice given to U.S.A. sailors was to be very careful as to cleanliness, and to use calomel ointment.

LIEUT.-COLONEL GIBLIN asked if pay was stopped in Royal Navy.

FLEET SURGEON HALL, in reply, said no loss of pay was involved, but it was a very serious offence to conceal disease. In German Navy sailors could purchase tubes of calomel ointment to take on shore.

THE TREATMENT OF GUNSHOT WOUNDS OF THE ABDOMEN IN THE FIELD.

LIEUT.-COLONEL T. FIASCHI, D.S.O..

Hon. Surgeon, Sydney Hospital.

The general opinion of British medical officers during the last South African campaign was that gunshot wounds of the abdomen should not be treated by laparotomy in the field. The usual treatment for them was to address the wounded man as follows:—"If you will remain a week absolutely still, eat and drink next to nothing, you shall have the best chance for recovery. If you have pain, let us know, and we shall relieve it by morphine." The results obtained were surprising. We had many cases in which the Mauser bullets had gone right through the abdomen from front to back, and from side to side, and, treated by the simple rules of rest, starvation and morphine, they were followed by complete recovery.

Evidently the very small perforations caused by these bullets were naturally sealed, and not infrequently the bullet would glance between the

various viscera and blood vessels without perforating. However, occasionally cases were met in which the strict enforcement of these golden rules was not sufficient to save life. Three cases, in particular, impressed me :—

The first was a distinguished Australian Artillery officer who, at Dreifontein, was shot by a Mauser bullet in the right hypochondrium. I and Major Perkins saw him accidentally. We were marching past the field hospital, where he was lying, and, being Australians, were called to visit him. We found him on the ground in a bell tent, quite conscious, and not much shocked. He told us that he had been shot the night before in the liver. He seemed otherwise so well that we spoke to him those words of encouragement usual under such circumstances, and left him. Shortly after our arrival in Bloemfontein we heard that, one or two days after our seeing him, he had died.

The second case was a corporal of the Royal Horse Artillery, a very brave man, who had been sent to reconnoitre a position. He came in touch with the Boer forces, and, on retiring, was shot through the sacrum. He never stopped, but rode two miles, straight back to his commanding officer, and, after giving him his report, came to our field hospital for help. We found a wound of entrance in the middle of the sacrum, but no wound of exit. Owing to the necessities of war we were not able to send him back to the third line. For over ten days he seemed to progress well without symptoms, then developed those of an insidious peritonitis, and he ultimately died a fortnight after receiving the wound.

The third case was that of a Boer prisoner who had been wounded in a small skirmish near Veltervreden, during the march on Barberton. In him, also, we found only a small wound of entrance, a little above the centre of Poupart's ligament. The patient seemed quite well that night, without symptoms, but, on the next morning, some swelling and bluish colour appeared above the wound, suggestive of internal hæmorrhage. We were then in a mountainous and roadless country, and the action we were taking part in was a very risky one, and required great speed. I had to march on with the brigade, and the field hospital, with Captain Dick, had to retire with the transport column to the Godwan river valley, through a most difficult road. There was much shaking of the patient and delay, with the result that, when Captain Dick arrived at a place where help could be obtained, the patient was too far gone, and died.

I have often thought over these cases, and am convinced that had they been promptly laparotomized they might have been saved. In the first case, the wound in the liver might have been plugged with gauze, and the hæmorrhage stopped; or, if there had been leakage of bile, a drain might, in addition, have been put in. In civil practice such treatment gives good results, though the gunshot wounds met in civil hospitals are far worse than those met in war. The former are generally from revolver bullets; these are large and soft, and inflict wounds by far more cruel than those from the modern rifle-bullet. Furthermore, the revolver shots met in every day life have been generally inflicted at short range, giving the full explosive effect. M. A. Newman* gives a series of six such revolver wounds of the liver, in which prompt laparotomies gave four recoveries and two deaths.

The second case, that of the sacral wound, I have no doubt, was a wound of the rectum and bladder, and, from the many days the patient

* M. A. Newman. *Deutsche Med. Wochensh.*, quoted by *La Semaine Medicale*, 20th May, 1908, p. 246.

dragged along, I think that there must have been primary sealing, followed later on by sloughing and leakage. Had a laparotomy been performed the fatal peritonitis might have been averted.

The third case died of venous hæmorrhage, most likely due to wound of one of the iliac veins. This, by laparotomy, might have been ligatured, and the patient saved. In this case the rule of absolute rest could not be observed. Had we been in any other country, it would have been better to have left the patient on the spot, but we were in an absolute mountain desert.

I have searched the recent literature accessible to me on the Russo-Japanese war†, and have found rather conflicting opinions on the treatment of abdominal gunshot wounds in the field. Colonel John Van Reusselaer Hoff, Assistant Surgeon-General of the United States Army, who went through Manchuria, quotes the following experiences of surgeons who were on the Russian side:—"Dr. Brentano, of the German Red Cross, in 600 cases of gunshot wounds, had 127 surgical operations. Of these only one was a laparotomy for an abdominal wound, with peritonitis, and resulted fatally. Four pelvic abscesses followed gunshot wounds of the abdomen, these were evacuated naturally per rectum, and recovered."

"Dr. Butts, in charge of a red cross hospital, at Gotsiadan, gave his opinion that rest and surgical non-interference are the proper treatment in wounds of the abdomen."

Another chief operating surgeon, not named, gives the following opinion:—"Amongst the most serious wounds that we have encountered are those of the abdomen, in the treatment of which very little has been accomplished. We can only say that the more rest the patient can have from the very moment of the infliction of the wound the better the result. The character of the missile, bullet, schrapnel or shell, is of great importance in determining the result, and lesions caused by each of these should be considered separately. The severity of wounds of the abdominal region, caused by the modern bullet, is directly proportioned to the range. As the result of the experience gained in several operations, done for penetrating gunshot wounds of the abdomen at close range, I was deeply impressed with the great explosive effect of the modern bullet. In some of the cases, in which the stomach was full, it was burst into pieces, and entirely separated from the surrounding organs. A like result followed with a full bladder, and great havoc was wrought in liver, spleen, and kidneys. In such cases, as was to be expected, the symptoms of shock were pronounced, and resembled those of internal hæmorrhage. The wounded man almost invariably fell to the ground, complaining of intense pain in the belly, but did not lose consciousness. These cases never spoiled the statistics of the rear hospital, for they died on the field, at the dressing station. Beyond 400 metres the explosive effects were not observed, and the patient did not at once fall. Soon, however, symptoms of shock supervened, with vomiting, and the wounded men lay down. This condition usually continued for several days, and led to early operative interference, which only resulted unfortunately."

This reporter estimated the mortality from rifle-bullets "of the abdomen at 40 per cent. of such cases. Shrapnel wounds penetrating the abdomen were more serious, the mortality being 80 per cent."

The conclusions of this chief operating surgeon are:—"That to recommend the doing of laparotomy in a divisional mobile military hospital

† Transactions of the American Surgical Association, 1906, Vol. XXIV., p. 342.

during the progress of battle, with a constant inflow of wounded, is unwise. From amongst several evils, the least should be chosen, and time and strength are not available for such operations under such conditions. These abdominal cases should not be operated on, but should be given rest, temporary dressing, and morphine."

With these conclusions, Colonel Hoff agrees and adds:—"The suggestion that we should follow the rule of the ancient warriors, who went to battle in clean raiment and a clean body, is valuable. Add to these an empty stomach and bladder, and there is little left to be done but to trust in Providence. If wounded, keep the wound clean, and give Nature a chance, at least, until a permanent hospital is reached."

When one considers that gunshot wounds of the stomach, in civil hospitals, treated by laparotomy, give only 25 per cent. of deaths, as shown by Dr. Walton Martin's † series of 25 cases, these conclusions of Colonel Hoff cannot be accepted as the last solution of this important problem. I am glad to say that another eminent writer on the Russo-Japanese war gives us more hope. This is Dr. Leo Bornhaupt, of Riga, § who was in command of the Moscow-Siberian Red Cross Association, and his paper proves him to be a keen observer. Want of time prevents me from giving you detailed extracts from it. His conclusions are:—"I must now, at the finish, agree with the opinions of Hippel, Seidel, Hildebrand, and others, in regard to primary laparotomy; that a certain number of penetrating gunshot wounds of the abdomen should be primarily laparotomized. in cases of intra-abdominal hæmorrhage, and of wounds of the gastro-intestinal canal, attended with much extravasation of its contents in the peritoneal cavity. Such extravasation being due to multiple perforation or large openings in the gut.

"This operative activity can only be made possible by special equipment of the field hospitals right at the front. The hospitals of the first line, and, at the most, those of the second line, are, in surgical respect, the most important points. The number of these hospitals should be a sufficiently large one, and of a sufficient capacity. Here, the most experienced surgeons should be at work, and there should be no sparing of the *personnel*."

I accept Dr. Bornhaupt's conclusions, and, whilst recognising that not in all campaigns, nor in all phases of the same campaign, could we carry into effect the humane desire of giving to every soldier, wounded in the abdomen, the best chance, I think that an attempt should be made to give every brigade the means of doing so. It is a question of organization. Every brigade field ambulance should include, amongst its officers, an abdominal surgeon. It should also have a suitable operating tent and table. Good light is an absolute necessity for abdominal surgery. The present service operating tent has not sufficient light to be suitable for abdominal operations. The light should come from one side, and from above. A tent should be planned, having a large window on one side, extending for 2 feet in the roof, on the same plan as in our best operation rooms, *e.g.*, the Want Memorial room, in the new wing of the Sydnev Hospital. Our best light for operations, in this hemisphere, is from the south, and the tent could be so oriented as to obtain that light.

† Walton Martin. The lesions associated with gunshot wounds of the stomach. *Annals of Surgery* May, 1907, page 690.

§ Dr. Leo. Bornhaupt. *Archiv für Klinische Chirurgie*, 1907, 81 Band.

Glass windows cannot be well carried, therefore a suitable non-fragile transparent medium should be devised for the windows, so as to protect the abdomen from dust and flies.

For night work good acetylene lamps should answer well.

Our old-fashioned service operation table has done its time, and should be passed over to the regimental cooks. The best table that I know for the purpose is Lilienthal's portable, as made by Kny-Scherer. It gives Trendelenburgh's position, and has the elevating centre-piece for the kidney and liver positions. It can be easily packed, weighs only 35 lbs., and costs about sixteen pounds (£16).

Thus equipped, it will be the duty of the abdominal surgeon to so organize his staff of anæsthetist assistants and orderlies as to be able to carry on the delicate work of abdominal surgery successfully.

In this difficult question, I think that there is room for improvement and hope. For the future, all gunshot wounds of the abdomen, received at short range, that is, under 1,000 yards, should be submitted to laparotomy. Those received beyond 1,000 yards should be treated by simple rest, starvation, and morphine, unless much collapse and rigidity of the abdominal muscles are present, pointing to wound of the liver or spleen, or of some important blood vessel. Any wound thus treated, without laparotomy, and doing well at first, but, later on, developing symptoms of leakage or suppuration, should be at once operated. All shell-wounds, penetrating the abdomen, should be at once operated.

Any great reduction of the 50 per cent. mortality of gunshot wounds of the abdomen, in a future war, will not only mean a surgical triumph, but also a great moral victory for that nation who will so organize as to obtain it.

DISCUSSION ON PAPER BY LIEUT.-COL. FIASCHI, D.S.O.

GENERAL WILLIAMS, C.B., endorsed Colonel Fiaschi's view, as to taking each case on its merits. He considered you could not give any definite prognosis, as bad cases often got better, and mild ones died. The New South Wales ambulances had often to leave the cases of abdominal wounds at farmers' houses, when the treatment they got was rest, morphia, and starvation.

He was in favour of a specialist, in abdominal work, at the "Clearing Hospital."

CAPTAIN HORNABROOK believed in, if possible, putting a tent over the man where he fell, and treating with rest and starvation.

THE POSITION OF THE ARMY MEDICAL SERVICE WITH REGARD TO SANITATION AND HYGIENE.

LIEUT.-COLONEL EAMES.

According to the orders of the Australian Army Medical Service, the officers of the A.A.M.S. are charged with the care of the sick, the administration of military hospitals, and with the duty of recommending to general and other officers commanding, verbally or in writing, any precautionary or remedial measures relating to barracks, encampments, garrisons, stations, hospitals, transports, diet, dress, drill, &c., which may in their opinion conduce to the preservation of the health of the troops and to the mitigation and prevention of disease in the Army. (See No. 82 "Orders for Army Medical Services.').

Our Army Medical Service is built up in consonance with the foregoing instructions, and arrangements have been made for permanent services, garrisons, encampments, and all movable columns.

So far as it is possible, under existing circumstances, to formulate an efficient system for instant service in the field, I think I am justified in saying that it has been done, or arrangements have been made for carrying it out. All the details have been arranged for medical officers, the *personnel* for infantry and light horse field ambulances, ambulance wag-gons, transport vehicles, medical and surgical equipment, and all the other accessories for service. Provision has also been made for the horseing of all vehicles. So far, at any rate, our service is on a par with other Army Medical Services; also our hygienic and sanitary methods will, I dare say, compare favorably with those in use elsewhere.

But that these arrangements would be sufficient to keep an army in health and efficient, under service conditions, I am far from thinking. The experience gained in almost every war teaches that to prevent ruinous waste of life, much greater care and attention to hygiene and sanitation are absolutely imperative. Even in our latter-day wars, sick casualties have, as a rule, accounted for more deaths and ineffectives than would seem justifiable in the light of our present knowledge of the etiology and communicability of disease and the well-established methods of prevention under peace conditions.

When we consider how, as civilization has spread, quarters of the globe which formerly were regarded as veritable death-traps are now healthy and salubrious, it does seem strange that so little advance has been made in preventing sickness in war.

After nearly every campaign in which Great Britain has been engaged, the British press and public have almost invariably made scathing comments upon the losses sustained by the army through disease rather than wounds, and these were always levelled at the Army Medical Service. It was, however, the experience of the late South African war, during which 450,000 cases passed through the hospitals, only 5 per cent. of which were due to wounds, that thoroughly startled the nation and caused the initiation of the reforms that have since been introduced, and the splendid results achieved by the Japanese Army Medical Service in the recent war with Russia have shown beyond all doubt that it is possible to conduct even a great campaign with comparatively little sickness amongst the troops engaged.

The War Office has at last realized the vital importance of improved hygienic and sanitary methods in the prosecution of a war, and an instance of this rational and necessary change in the attitude of the British "powers that be" is afforded by the following order, of comparatively recent date, which is now included in the King's Regulations:—

"Every C.O. will be held responsible for the health of the unit under his command, and he takes upon himself a grave responsibility if he disregards the advice tendered by his Medical Officer."

Another satisfactory feature is that hygiene is a compulsory subject in the examinations for promotion to the rank of captain in all arms, and each company officer is enjoined to impart to his men the knowledge he has acquired of the subject. Then there is a sanitary squad in each regiment. This squad consists of one N.C.O. and eight men, who are instructed by a medical officer, usually by means of a three weeks' course, practical and theoretical. Each corps also sends an officer to the course, so that he may be able to supervise the work of the squad. The men of all sanitary squads are instructed in all the methods of preparing latrines, wash places, kitchens,

refuse destructors, and so on; and their duty is to carry out any instructions they receive concerning the sanitation of the camp or barracks of their unit. In addition, there is the regimental water section, consisting of four men of the R.A.M.C., who have been trained in everything appertaining to the provision of a good water supply and the preparation and use of filters.

One of the most important members of the new *personnel* is the sanitary officer. The duties of this officer are mainly advisory. He is required to make systematic inspections of all military stations within his area, and is expected to attend to any matter affecting the health of the troops or the sanitary condition of their surroundings. He must be prepared to advise regimental medical officers, or any officer who seeks information from him. In war, the R.A.M.C. will supply a sanitary section under an officer for each base, and a sanitary squad for each post on lines of communication.

These changes in the Imperial Service must commend themselves to us. Here we see that the onus of keeping the army in an efficiently healthy condition is taken off the shoulders of the officers of the Medical Service and placed on those of the General Officer Commanding and his subordinate officers.

The British War Office now recognises the fact that it is easier and cheaper for the dog to wag the tail than for the tail to wag the dog: in other words, that no Army Medical Service can keep the army healthy and efficient unless its recommendations are accepted and given effect to by the officer in supreme command and his divisional, brigade, and regimental commanders.

The Army Medical Service can advise, can treat the sick, and can point out the methods of prevention of disease, but it rests with the executive of the army, by systematic training in preventive methods in times of peace, and cordial and sympathetic co-operation with the Medical Service at all times to insure a diminution of sickness among the troops in war.

These are the principles that must guide us here in Australia, and what we have to consider is, how to apply them in order to insure the maximum of efficiency. In the first place, as this matter of prevention of disease is of paramount importance to our Defence Force, it surely is only reasonable to expect that the executive authority—the Military Board—should have, as one of its members, a medical representative, one well versed, not only in hygiene, sanitation, and preventive methods, but also in organization, transport, equipment, and all the constant and rapid changes of conditions which are incidental to warfare.

Secondly.—All officers of the Defence Force should receive instruction in hygiene, sanitation, and preventive methods, and should take up these subjects for examinations.

Thirdly.—Every N.C.O. and private should be instructed in sanitary and preventive methods, and a man's practical knowledge of these subjects should count largely in determining his yearly efficiency.

Fourthly, as all the States of the Commonwealth provide practically free education, the pupils, girls as well as boys, of State schools over the age of twelve years, should also receive instruction in these three subjects. This would secure the thorough grounding in these very important subjects of the rising generation at an early age, and should prove a powerful factor in promoting the future health of the people of the Commonwealth.

Should some such measures as I have suggested be adopted, in addition to those drawn up for the Imperial Service, the position of our Army Medical Service, with regard to hygiene and sanitation, will become a strong and logical one.

Ours is a branch of the Service just as essential in its way as artillery or infantry, only that we have to do with the economics of warfare—to save wastage and increase the numbers of efficient, to care for and restore the temporary inefficient, and to advise generally the executive of the army in all matters relating to the health and efficiency of the troops. The question of securing the best results from the advice tendered by the Army Medical Service must depend on the executive, in the same way as does the standard of training, discipline, and armament of the force as a fighting machine.

I would suggest that our camps of continuous training, and also whole day parades, might be used to greater advantage in the accustoming of troops to the necessity for caution, especially in regard to the matter of water. This commodity, the purity of which is essential to our well-being, and the impurity of which is the main factor in causing and spreading sickness on service, is provided for us on all occasions, of good quality, as a matter of course. Would it not be well at our camps of training and whole-day parades to treat the water as fouled, and take the steps necessary to render it innocuous, both regimentally and on occasions individually, so as to accustom all officers, N.C. officers, and men to look on all water on service with suspicion, and as requiring to be sterilized before being drunk? This might entail a little time and a little trouble, probably a slight expenditure, but the time, effort, and any cost involved, would be more than justified by the improvement in the health and efficiency of the troops that would result from such precautionary measures. Had such been the practice of the British troops in South Africa during the war with the Boers, I am satisfied that the return of sick casualties would have shown out as favorably as did those of the Japanese in the Russo-Japanese war.

I feel that I should not close this paper without referring to the great loss sustained by the medical profession, and more particularly by those interested in ambulance work, by the death of Dr. G. P. M. Woodward, which took place recently. Our late *confrère* was for 24 years Medical Officer of the New South Wales railways, and prior to coming to Australia he had a distinguished career as a medical officer in the Crimea, Indian Mutiny, Abyssinian, and Chinese wars, retiring from the army with the rank of Deputy Surgeon-General of the Royal Horse Artillery in India.

His work in initiating the Ambulance Corps in connexion with the New South Wales railways deserves the most cordially appreciative mention. His methods of instruction were especially valuable, and they might, in my opinion, be adopted by the Defence Force with decided advantage.

A PLEA FOR SOME DESIRABLE SPECIALIZATION.

W. RAMSAY SMITH, LT.-COLONEL A.A.M. CORPS.

The early Scots, on their fighting or raiding expeditions, were but little embarrassed with questions of transport, commissariat, medical department, or army service. Every man was mounted; his saddle consisted of a bag containing oatmeal, which he cooked in his shield.

Times have changed since then. Alterations in the mode of fighting, the specializing into cavalry, artillery, and infantry, each arm with its own particular work, have called into existence a number of special departments in the fighting force. A double problem thereupon arises—(1) how to make every special department the best possible in itself; (2) how to combine these diverse elements into one active, energizing, co-ordinating organism.

In the army, every man is expected to know his own work, and to do it. It is assumed that if every man does his special work, *i.e.*, the work for which he is best fitted, all will go well with his unit; and that if every department does its work, all will be well with the total force. Is the assumption often, or ever, verified in practice? If not, what is it that prevents a man's best or proper work from contributing to the general welfare and the efficiency of the total force?

Most of us have heard that there is a perceptible difference between the Royal Army Medical Corps officer and the civil surgeon. It is not a case of six in one and half-a-dozen in the other. The R.A.M.C. officer is ready to assert that he never found a civil surgeon who could make out his sick reports properly. The civil surgeon will tell you, in confidence, that he never knew a R.A.M.C. man who could do anything else. What is the proper work of both or either of them? They are both supposed to belong to a special department, and to be fully trained in special work.

Specialization may be briefly described as intrusting a matter to the man who knows most about it, and who can do it best. How far does specialization find a place in the administration of our forces? What is the place of the medical officer and what is his work?

In times not very remote, the volunteer or militia medical officer was expected to turn out at reviews in cocked hat and feather. In camp he was requested to make up a mixture or dole out pills to the sick man who had diagnosed his own complaint, and whose commanding officer had chosen the appropriate remedy. We know that this is not fiction. Let us hope it is now history.

Many people believe that the business of a medical officer is to attend to the wounded sent to hospital, and to treat the sick when he is called upon to do so. If he should venture to do anything else he may be told to mind his own business, or that he will be sent for when he is wanted, or that when his opinion is likely to be useful he will be asked for it.

Shall we be far wrong, however, if we say that the true business of the Army Medical Department is essentially and specifically to say who are fit for military training; how the fit are to be trained, fed, clothed, sheltered, lodged, entertained, and taught good habits; and how disease is to be fought—that active invisible scourge that, with one solitary recent exception, has been responsible for about 80 per cent. of deaths during campaigns? If it be granted that “the preservation of the army by the prevention of disease is the surgeon's duty, first, last, and nearly all the time.” what facilities are given him for doing this duty effectively? How far can the force of the man who knows, or who ought to know, be felt in the physical training, dieting, camp hygiene, and general welfare of our citizen forces?

First of all, what models have we been following? The traditions of the British Army. And what was the composition of the British Army? The soldier, it has been said, was a man who had in a fit of passion, or when drunk or from illness, want, or to avoid civil punishment, sold his personal liberty, bartered himself to the State without reservation. In return for this he got thirteen pence a day, out of which he had to pay his share of the mess and some other things. The State provided lodgings, medical attendance, and religious privileges. He was bound, at any time, and upon any ground, to destroy any other man's life, or to lose his own, at the word of command. He was, as rapidly as possible, drilled into that perfect man-slaying instrument, that consummate destroyer, that we and his enemies know him to be. And having no hope, no self-respect, no spiritual progression, nothing to look forward to, he

sank into the sullen, stupid, indomitable human bull-dog. He lived in hopeless celibacy, shut out from the influence of any but the worst of the other sex. He became proverbially drunken, licentious, and profane. He had nothing to look forward to but to be killed or to die of disease, or to be turned off—a stupid, helpless, and friendless old man. The soldiers were trained as fighters, nothing else, and they fought like the bull-dogs, and they were about on a par with those animals.

Matters have no doubt improved. Thanks to men like Dr. Henry Marshall, who was the real father of military hygiene, and Viscount Hardinge, who had the courage and far-sightedness to force on reforms, the military service has undergone great changes; but, after all, the British Army is still in the embrace of traditions, and we have our equipment, our drill, our physical training, our organization, our regulations framed largely on British patterns. Have these been very successful in the British Army? If so, does it follow that we should imitate them when our ends in view are different, and when the means at our disposal of attaining these ends are so very different?

The British soldier, a picked man, of mature years, medically examined and certified to be fit for training as a fighter, is taken in hand and disciplined like a race-horse to give a maximum of effect at a given moment during a period of limited service, and finally to be discharged, when his time has expired, without his country caring how much he has been injured in the process or unfitted for the civil and social duties of a citizen, or incapacitated for doing an average day's physical labour.

Is this the proper pattern we should imitate in making an Australian army? Is it the proper model to adopt when training our young lads who are looking forward to being citizens as well as soldiers?

Does it not strike you that we should inquire of the man who knows, before we take our own young lads with green bones and half-developed muscles and nerves, at an age when there is little or no reserve of muscle, brain, or stomach, and hand them over without medical examination to untrained instructors to be drilled in the same exercises and physical gymnastics as the mature man who is to be made a fighter and nothing else?

Who determines the camp life of the cadet? Who says what exercises the lads shall do on parade or on field days? Who is responsible for keeping youths on parade until they drop one by one from faintness and exhaustion? Who is responsible for keeping them standing on a cold morning for half-an-hour doing nothing but waiting because the rest of the force is not ready to march out? Does any one urge that the moral benefits to the delicately-nurtured lads, derived from associating with "all sorts" of men in a general militia camp, are adequate compensation for the physical injury that arises from ignorant methods of training? In fixing the principles and in supervising the details of cadet camp life, how far do we depend upon the man who knows?

Turn now to a subject in which the expert is consulted, or for which he is supposed to be responsible, viz., the health of the forces in a camp of training. What amount of responsibility is placed on the expert? He may be consulted about the camp site, or he may not. He may be asked to recommend a system of camp sanitation, and may do so; and then he may find that it has been ignored or rendered inoperative by the omission of some essential. He may take all pains to insure a pure water supply, and discover that in practice the details are intrusted to incompetents. When the medical officer finds principles ignored and details neglected, what is his remedy? He may report. And if nothing is done he is privileged to report again; but he has no power to order

anybody to do anything. The man who was detailed to look after the water-tank and keep men from dipping dirty buckets in it, was required by his commanding officer to attend his drills. The men who were put in camp orders to report daily at the Supply Dépôt for the purpose of camp sanitation were required for "sentry-go." And when these and such like matters are reported on by direction, the report of the medical officer goes, perhaps, to the parties who were to blame for the maladministration. Would it not be well if reports on how the officers and men attended to the details of camp sanitation were made by the combatant officers to the Medical Department, and sent on with the Chief Sanitary Officer's remarks to a medical member of the Military Board? Would it not be better if the medical officer, who is held responsible for certain work, had the necessary executive authority to issue orders and see that they were carried out?

I have selected camp sanitation as an illustration, because in this matter more than in any other we approximate to the conditions of actual warfare. There is more of the reality, less of the make-believe, about it than about any other subject of training or administration; and it thus forms a proper touch-stone by which to test our system of medical administration.

Thus far we have considered the limitations that are placed upon the medical officer in his endeavours to give effect to what may legitimately be assumed to be his proper or special work. Another aspect of the subject now demands consideration, viz., the burdening of the medical officer with varieties of work that could be done as well, and probably much better, by others.

Medical men who are engaged in extensive practice, or who are recognised as eminent in their professional work, are not usually experts in such matters as coach-building, harness-cleaning, the fitting on of liveries, and the intricacies of bookkeeping and correspondence. Yet such men are invited to give their services to the forces; and these services include all these extraneous matters and many more. It hardly seems reasonable that a skilled physician or surgeon should be required to devote a large amount of time to work which he is not accustomed to do, and which, therefore, involves a large expenditure of brain and other energy, when the work would be done much better by a clerk with the rank of corporal, or a regimental tailor with the rank of sergeant.

Further, it would appear only reasonable that matters relating to drugs, instruments, hospital tents, bedding and such like should be placed under the responsible charge and care of a pharmacy department which should include commissioned officers in its *personnel*. We have in our States people who are eminently well qualified to undertake such work, but we can scarcely expect gentlemen at the head of our large wholesale chemists' departments to join either the active forces or the reserve with the rank of sergeant or warrant-officer.

If I were to place before you illustrations of the evils that have been experienced in the field or in invalid vessels and troop-ships on account of the unsatisfactory position of the medical stores question, I should make out a strong case and show the self-evident necessity for reform. I believe I have said enough to justify a plea for some more specialization in the Army Medical Department.

In framing a scheme of what is desirable in the way of change, why should we not set down a statement of what the forces require, and then decide how these requirements are to be met in the simplest and most direct fashion by utilizing the men who are best qualified to assist, each

in his own particular department of pharmacy, physic, surgery, or sanitation? Our system need be none the less effective if, in drawing it up and administering it, we give as much consideration to local materials, *personnel*, and conditions as to the traditions of other times, other places, other peoples.

DISCUSSION ON PAPERS BY LT.-COL. EAMES AND LT.-COL. RAMSAY SMITH, TAKEN TOGETHER.

SURGEON-GENERAL SKERMAN considered that it was most important to have men for sanitary work specially enrolled and directly under medical officers. He had recently, for practice at a camp of instruction, issued orders that all water available was dangerous and infected, and so had every precaution taken. He was pleased with the experience given, and would have done it again.

CAPTAIN VANCE urged that sanitary officers should be appointed, and their position fixed so that they could not be interfered with by seniors.

GENERAL WILLIAMS, C.B., remarked upon the great wastage due to want of knowledge of combatant officers. He expected a great change now that all officers had to learn and pass in sanitation.

MEMORABILIA OF THE SOUTH AFRICAN WAR—SURGICAL, MEDICAL, AND MISCELLANEOUS.

A. WATSON, MAJOR, A.A.M.C.

When the day arrives at last on which the Commonwealth must face the music herself, that medical man will be held in contempt who has not availed himself of the opportunities of instruction in war training which have been rendered possible by the efforts of the Director-General of the Army Medical Services, Surgeon-General Williams.

The *rôle* the medical profession should play in war is to assist in maintaining in the ranks the maximum number of men able to march and fight. Homer said long ago that a physician in war is worth many others—if he meant that a physician was worth many surgeons he was not far wrong. In the South African war we did not eliminate the physically unfit and wasters at the start, and from lack of hygienic measures, we failed in preventing those scourges of armies—enteric and dysentery; but we succeeded as surgeons in avoiding much of the surgical slaughter practised by our forefathers.

One of the special features of the late Boer war was the working of civilian doctors and nurses along with the military medical service. On war being proclaimed, numerous well-intentioned civilians of both sexes from distant corners of the Empire hastened to South Africa, both singly and in flocks, like vultures to the carcass of a dead horse. From South Australia, a few medical students went as troopers. I preceded them as a surgeon, although I had not the faintest conception of the administration of the various military medical units either in peace or war, and knew nothing of the complicated routine connected with military hospitals, sick convoys, and hospital ships. I was instructed by Captain G. Marshall, in medical charge of "A" Battery, New South Wales, during the sea passage to Africa as to the practice of first aid, and the functional work of the bearer company and dressing stations, but, during the sixteen months I was in Africa, I was never called upon to put my acquired knowledge to the test. Captain Marshall supplied me with a field dressing to sew in.

my coat, and on my arrival in Durban, Mr. Jesse Coope, of the R.Y.S. *Sunrise* hospital ship for officers, gave me a revolver with which to defend myself. The leading citizen of South Australia had supplied me with a bag of sovereigns in case I might be taken prisoner by the Boers. I never used Captain Marshall's field dressing, nor shot a Boer with Mr. Jesse Coope's revolver, nor did I spend the South Australian Macænas' money till later on, when the Natal campaign was finished, and I was permitted to proceed to the Transvaal, in a private capacity, by Lord Roberts, on the recommendation of Surgeon-General Wilson, P.M.O., of South Africa. By that time, however, I had learnt that war surgery did not consist in lopping off limbs, resecting joints, sewing up bowels, or even in ligaturing blood-vessels. I realized that its sole aim was to immobilize wounded parts and prevent sepsis. I was overwhelmed with regret at the thought that I had been responsible for an unpardonable amount of harmful carpentering during my brief connexion with the British Army. I endeavoured to console myself with the thought that all damage done by the most aggressive surgeon was infinitesimal in comparison with that wrought by those scourges of armies—enteric and dysentery, which, to a large extent, might have been prevented had there been an efficient sanitary and nursing staff at the commencement of the war.

It cannot be said that in Natal the sanitary arrangements broke down, as they did on the Cape side under Lord Roberts during that great soldier's march to Pretoria. On the Natal side, General Buller, unless he could feed his men properly, showed a disinclination for risking their lives. He also possessed a personal knowledge of sanitation, as evidenced by the convalescent hospital which he established at Howick, with such satisfactory results. His principal medical officer was a man of exceptional ability, comparable to the United States General, Leonard Wood, M.D., or of Lord Kitchener, had that General happened to have belonged to the medical profession. Colonel Gallwey, General Buller's P.M.O., used red tape as Nelson did his telescope, and reduced chaos to order without apparent difficulty. Amongst other feats, he even succeeded in training destitute civilian refugees, or scallywags, to act as efficient stretcherbearers, even in the face of death itself. He also harmonized the relations of the civilian surgeons and nurses with their military brothers and sisters, so that a spirit of mutual compromise was established, which kept both parties on the best of terms throughout the whole campaign.

When, in course of time, the unfortunate War Office found it difficult, from considerations of policy, to refuse the offers of eminent surgical authorities, whose presence in the field would have been an element of expense and embarrassment to the transport service, and in no wise a source of gratification to the Commanding General, Colonel Gallwey rose to the occasion, and detailed Mr. Treves to service at the front, where his genius and skill would find proper scope; but the others he planted, without hurting their feelings, where they could do no harm, and where their presence would inspire as much confidence in the minds of the British public as if they were being shot at every day of their lives.

In the Natal campaign, just when operative surgical work was most plentiful, necessity, occasioned by the rapid transit of cases along the lines of communication, curtailed one's opportunities of prolonged observation, and prevented one from following the after histories of those who were invalided to England.

Up to January, 1900, with the exception of field hospitals, and one stationary hospital at Estcourt, there was no accommodation for sick or wounded north of Pietermaritzburg. Then, on the 10th January, 1900,

the general hospital at Mooi River was established, with 1,000 beds, under Colonel Clery, an Irishman born to command, and at his best when on horseback. After Spion Kopf and Vaal Kranz, most of the serious cases, both medical and surgical, were absorbed by the Mooi River, and Nos. 1 and 4 stationary hospitals, whereas cases capable of transportation and immobilized gunshot fractures and flesh wounds (809 in all) were received during the three weeks ending 20th February, 1900, into the Maritzburg hospitals, which had a capacity of 1,300 beds, under Lieut-Colonel Johnson, P.M.O. During the following fortnight 331 cases were received direct from the battlefield around Ladysmith, after which fresh admissions for gunshot wounds fell off to nothing till General Buller made his further advance into the Transvaal. I have said nothing about the medical history of the siege of Ladysmith because the presence here of my pupil, Captain Hornabrook, of Wagon Hill renown, would render any reference to such presumptuous on my part.

Operative work at the military hospitals was not so great as people in Australia might think, and what there was of it might well have been postponed, and much of it had better not have been done at all. Sepsis, which in the earlier part of the Natal campaign was not more common than in the hospitals of Australia, became frequent during the final advance on Ladysmith in consequence of the men being fatigued, and unable to wash or to change their clothes and putties night or day for a fortnight. Tetanus, which was said by the local surgeons to be common among the native races at a certain period of the year, was conspicuous by its absence amongst our troops. Not so, however, was malignant oedema, of which I observed several instances. I saw one fatal case of multiple pyæmic abscess in a kaffir, who had scratched his hand while employed in burying the dead horses after Colenso.

During the lull which succeeded the relief of Ladysmith, medical cases increased, and dysentery and typhoid maintained the same high summer level as during the time when the troops were marching and fighting. Cases of non-amœbic liver abscess cropped up, also puttie-phlebitis, staphylococcal ulceration (Veldt sores), visceral ptosis, piles, hernia, mental aberration, oral sepsis, tertiary bone lesions, maniacal headaches from eating cordite, suicides, mule kicks, &c. When General Buller made his further advance into the Transvaal there was a fresh influx of wounded, British and Boers alike, differing from those received during the various attempts on Ladysmith in being cleaner cases, and uncomplicated by sepsis. It has always been a great satisfaction to me to look back on the humane manner in which, under Colonel Johnson's officers, British and Boer were treated alike in the great hospitals of Maritzburg, where the wisdom of the War Office in utilizing the otherwise unused affection of women as trained nurses justified itself to the full.

I said good-bye to Natal at Charlestown, on the Transvaal boundary, at the foot of Majuba Hill, where Colonel Daly had established the No. 1 stationary hospital. This was one of the best appointed stationary hospitals in Natal, or, indeed, anywhere throughout South Africa. Colonel Daly seemed to me to provide for every contingency—the milk supply, bakery, baths, and even to a cemetery with flowers, for in the best appointed hospital death will occasionally step in. His brother, Dr. Daly, of Gisborne, who is with us to-day, has every reason to be proud of such a distinguished relative. After leaving Natal, I proceeded to the Transvaal and Orange River Colony, with a view to gaining further experience in the hospitals, horse-camps, and laboratories at Pretoria, where the now famous pair of scientists, Colonel and Mrs. Bruce, were investigating

diseases of man and beast. When plague broke out in Cape Colony, I followed Professor Simpson to Cape Town, remaining there a month under his ægis before returning to South Australia to resume my duties as teacher of human anatomy and its applications.

VARIETIES OF WEAPONS.

Through the kindness of Colonel Carr, Officer Commanding Johannesburg Fort, I was enabled to inspect a stack of weapons captured from the Boers. Amongst them were some real museum specimens. The breech of one sporting rifle was inlaid with gold. Besides Mausers, the Boers used Winchesters, Sniders, combination sporting rifle and 12 bore shot gun, Mauser carbines, Martini-Enfields, Lee-Enfields, Lee-Metfords (captured from the British), Steyer, and Geudes (a Portuguese rifle). The two last carried mantle bullets larger than the Lee-Metford. Occasionally an old elephant muzzle-loader, with a flint lock, was met with.

WOUNDS MOSTLY CAUSED BY SMALL-BORE BULLETS.

The vast majority of gun-shot wounds were, however, caused by modern small-bore bullets. In our men they were chiefly Mauser and shrapnel bullet wounds, but sometimes Lee-Metford bullet wounds were observed. In the last case, the weapons were usually Metfords that had been taken from the British; but at times the wounds were due to our own men mistaking friends for foes in the dark at close range (Willow Grange), and inflicting frightful injuries. The so-called explosive effects at a short distance were terrific. The wounds in such cases were comparable to those made by a Martini. The closest quarters I noted occurred in the case of two suicides, where practically all the brain had been blown away.

Lieutenant Blair, of the New Zealand Mounted Infantry, told me that he carried a Mauser carbine in preference to the regulation Lee-Metford, till one day when the characteristic "tick-tock" report of this weapon drew British fire upon him. He also showed me a soft-nosed bullet, with a percussion cap in its tip, which he had taken from Bosmann, De Wet's Chief of Staff, in February, 1900. At 30 yards he fired one of these bullets into a fowl, and blew the bird to pieces. He then fired, at the same distance, an ordinary Mauser bullet into another fowl, which ran 10 yards before falling dead. Captain Walker, of the Queensland Mounted Infantry, took a similar bullet from the bandolier of a Boer at Wolverbock, who, just before he died, had shattered the cranium of a New Zealander with a bullet doubtless of the same make.

The Jeffry bullet, with four splits in the mantle, is not as fatal as its inventor meant it to be.

Several methods of rendering the regulation small-bore bullet more deadly were practised. Some Victorians told me that they removed part of the mantle when in want of antelope meat. I know of two cases where flesh wounds were caused by bullets from shed cartridges, which were accidentally swept into the camp fire. There must have been thousands of these bullets scattered about on the veldt by being jolted out of the cartouch boxes. I picked up seven in the course of a mile's walk in the vicinity of Pretoria. Mauser cartridges being carried in clips were not liable to be wasted in this way.

VARIETIES OF WOUNDS.

The varieties of gun-shot wounds, observed in South Africa, were due principally, but not solely, to the differences in type of the projectile employed.

Glancing contact of shell fragments was responsible for large lacerated surfaces, which some surgeons vainly endeavoured to cover over by plastic operations. In the case of a Boer, du Plessis, who had his manubrium and the sternal ends of his clavicles torn away by a piece of lyddite shell while he lay disabled by a bullet wound of the left knee joint, the whole surface of his skin was stained a bright canary colour by the picric acid fumes of the projectile. He died 32 days later as a result of sepsis and amputation. The chasm in the anterior mediastinum was almost filled up with granulation tissue. The yellow colour gradually faded within the first week.

EFFECT ON BULLETS.

It is extremely rare for a small-bore bullet to show any alteration of shape in passing through the human body, even if it does strike bone. Alteration of shape within the human body occurs only in cases where the bullet glances on hard bone at long range. In such a case, it may become slightly bent and flattened. This is the only explanation of one case I saw with Mr. Clinton Dent, in which, judging only by the wound of entrance and exit, the bullet must have gone through the heart.

SEPSIS.

The round bullets of shrapnel and the cogs of segment shell, with small velocity and high trajectory, were prone to remain in the tissue, and to produce sepsis from the foreign matter they carried with them. At times, when metal alone was buried in the tissues, no inflammatory change resulted. I saw a tumour of the pectoralis major muscle turn out to be a cog when it was exposed by operation.

In order to protect the grooving of their rifles, the Boers were in the habit of coating their bullets with paraffin wax. This gradually turned a vivid green from the formation of verdigris of the cupro-nickel plating of the mantle, and gave rise to the unwarranted suspicion of intentional poisoning. The poisoning, however, was due to ordinary sepsis, as the clips holding the Mauser bullets were carried in the pocket before being transferred to the bandolier, and the wax naturally picked up septic matter.

“ DELAYED ” FRACTURES.

It will be well to record here two unusual cases of fracture of the femur after bullet wounds of the thigh. In the first, a man who had been wounded a month previously, and was about to be discharged from the hospital as convalescent, tripped on a mat and snapped his femur. In the second, another man, six weeks, after a similar injury, while dancing for joy, on the relief of Ladysmith, also fractured his thigh. In both cases there resulted vicious union with shortening. This may have been due in some measure to the long splint which was used. A Hodgen would probably have produced a better result.

PICRIC ACID STAINING.

Lyddite shells were widely destructive only when they burst inside a building. Their tinctorial properties, due to the picric acid they contained, I have already alluded to in the case of the Boer, du Plessis. As lightning was wont to play amongst the ironstone kopjes, it is a wonder that accounts of shells having been exploded by electricity are not recorded, especially since many men were killed by lightning, which is worse in South Africa than in other parts of the world.

A blacksmith at Ladysmith showed me an English 96-lb. shell, which had been hit by a Boer segment shell, which had littered the inside of the bigger shell with its cogs (segments).

SENSATIONS OF IMPACT.

The statement that a soldier may be wounded without knowing he has been hit, or go until he faints from loss of blood, is not borne out by fact. Even in the case related by Dr. Hornabrook, the soldier, although he did not know he had been hit by a bullet, none the less thought he had been struck by a flying piece of rock. As a rule the wounded man describes the effect as resembling a blow from a sledge hammer, a brick, or a crow-bar.

CHARACTERS OF WOUNDS.

The character of the wounds of entrance and exit in the case of the modern small-bore bullets varies according to the range, velocity, angle of impact, and the nature of the part struck.

The small-bore bullet when at its greatest velocity has an explosive effect and shatters the bone into many fragments, while with less velocity it has a drilling effect.

The practice of exploring bullet wounds, unless all modern appliances are at hand, which they never are at war, cannot be too strongly condemned. In any case, no probe should be employed. The forefinger is the best instrument. Even the telephone probe may mislead under some conditions, *e.g.*, if the patient has metallic fillings in his teeth. Improved X-ray apparatus and a competent observer are the chief desiderata.

The gravity of fractures from gunshot injuries is due to sepsis, rather than to hæmorrhage, or even the extent of comminution (*cf.* the case of the New South Wales lancer). Sepsis is the subject that should always be presented to the mind of the military surgeon. If he cannot forestall it, he can at least do his utmost to arrest it. In wounds of the abdomen, however, hæmorrhage is the chief cause of death; sepsis, as a cause of fatal termination, comes later.

In injuries to bones by bullets the effects are as follows:—

At short range (*i.e.*, up to 200 yards) the bone is extensively fractured, and in many cases is pulverized. At medium range (from 200 to 1,000 yards) the bone may be bored through without apparent fracture, especially if it is of a cancellous nature.

At long range, there is generally fracture, but the fragments are large and the injury partakes more of the character of a splintering of bone, from the bullet forcing the pieces apart.

The exit wound in the two first cases, is, as a rule, of practically the same character as the entrance wound; but in the last case, it is generally of a fair size. So also in the case of head injuries at medium range, the effect of the bullet is more of a boring character, and the damage may be less than one could have believed possible.

The subsequent behaviour of a fracture or any other wound depends on the initial treatment.

TREATMENT OF BULLET WOUNDS, GENERAL.

It is best to remove an embedded bullet where the removal can be effected conveniently, for "Tommy" will never rest as long as he knows he is carrying a bullet inside of him. Under proper surgical treatment, the risk is practically nothing. A bullet, however, should not be disturbed until the patient is quite convalescent, unless it is causing suppuration, when it should be removed as soon as possible.

Even in bullet wounds in which there has been extensive destruction of the tissue and the large wound of exit, it is better to dress the wounds carefully first, and to take an X-ray photo., before exploring digitally or with a probe.

As a rule, where suppuration is present, the danger to life is greater if amputation high up is indulged in than if free incision and drainage are employed.

In gun-shot wounds, where fractures extend into the joints, the joint should not be opened unless complications set in.

In cases of secondary hæmorrhage, amputation is not necessarily the only course—for in a case of hæmorrhage from the common femoral artery in which the wound was plugged with iodoform gauze and left undisturbed for a week, the patient recovered, although distinct pulsation was given to fluid poured into the cavity on removal of the gauze. In a case of accidental wounding of the external carotid, while operating on a traumatic aneurism, the surgeon plugged the wound with iodoform gauze, which remained *in situ* for ten days, and the patient recovered. I have seen amputation resorted to by an eminent Irish surgeon when the collateral circulation was, in my opinion, quite good. In another case, where amputation would have been performed at the level of the lesser trochanter, had the patient not been in too weak a condition, recovery with a useful limb ensued.

WOUNDS OF THE BRAIN.

A transverse wound through the posterior part of the brain is much more serious than one in the anterior part. Its gravity increases the nearer it is to the base of the brain. I have seen transverse posterior wounds of the brain near the vertex that gave rise to very little trouble and practically to no symptoms; certainly to no more than anterior wounds near the vertex. The nearer, however, one approaches the base, the more marked is the difference.

In simple wounds of the brain, I think it is better not to interfere unless symptoms arise, such as severe pain, irritability of the patient, constant crying out, recurring fits, &c. The wound should be properly cleansed and dressed, and for the first few days at any rate, this should be done once or twice every twenty-four hours. Otherwise there should be no interference. As long as everything is progressing satisfactorily let nature do the work.

In cases of bullet wounds in the head, the patient may and often does apparently quite recover only to experience after many months a stiffness or rigidity of the limbs, or weakness apparently due to sclerotic changes of a descending character in the nervous system. I have seen these after-effects in more than one case in which the patient had apparently quite recovered, and was even fit to return to duty.

WOUNDS OF NERVES.

It is not wise surgery to cut down upon and attempt to suture a nerve immediately after the infliction of a bullet wound, because the nerve itself may not have been hit at all. I have known surgeons remove the only hope of life by performing laminectomy in a case where the spinal cord was not hit at all. In cases of complete severing of a nerve by a cutting instrument, such as a knife or sword, the nerve should be cut down upon and united as soon as the patient reaches a base hospital.

WOUNDS OF THE ABDOMEN.

In the case of abdominal wounds, if it is at all possible, the patient should be left where he fell; a shelter should be erected over him, and no nourishment administered. He should be kept quite quiet by hypodermic

injections of large doses of morphia for at least twenty-four hours before being moved, and then he should be taken to the nearest house and immobilized. I should feel inclined, were I shot through the abdomen, to shoot the man who attempted any exploratory examination of me. At the battle of Tinta Inyoni, on Tuesday, 24th October, 1899, when the order came for the Natal Mounted Rifles to retire, they were exposed to a very heavy fire. The following morning a trooper reported to Dr. Hornabrook that he had dysentery, because he had pain in the stomach, and he noticed that when he passed a motion there was blood in it. The doctor found that a Mauser bullet had entered about an inch above the crest of the ilium on the right side, and had passed out above the crest on the left. The man thought that he had been hit by a fragment of rock, but was quite unaware that a bullet had passed through him. He was removed to the hospital, and kept perfectly quiet, and he recovered.

I know of many other cases in which complete recovery followed non-interference in penetrating wounds of the abdomen, notably the case of Major Dalton, R.A.M.C., who was shot through the stomach and refused a drink of water proffered him by a compassionate Boer. He lay for thirteen hours on his back before crawling to a Kaffir kraal, his worst pain being caused by the stone on which he was lying. Colonel Fiaschi, D.S.O., Sydney, relates the case of a British officer who, after falling, shot through the stomach, was missed by the stretcher-bearers of his corps and left on the veldt till he was found some hours later by some Australians, and taken to their hospital. He escaped death because no surgery was attempted. He eventually rejoined his regiment, and two months later won the V.C.

I know of an English lieutenant who, after being shot in the abdomen, was carried out of action and placed in a sheltered spot by a New Zealander, Lieutenant Ross. Later on he was hoisted up from the veldt into a buck waggon and jolted about for eleven days until he reached Mafeking, when, being *in extremis*, an operation was performed, and he died. Nearly always where the knife was employed, the patient died. One may suture twelve openings in the small intestine and leave the thirteenth. The inevitable pulling about of the intestines alone is fatal. Too often operations were performed during the first part of the war which would not have been considered justifiable by the same surgeon after a few months more of war experience.

Dr. Neale, of Johannesburg, although he operated successfully on an intestinal perforation, was averse to gunshot wounds of the abdomen as a routine practice.

Even in cases where it is certain that perforation of the intestine has occurred, the patient, if fairly comfortable, even if he passes blood in his motion, should be left alone. This rule holds good at any rate for the large intestine, which, like the stomach, does not lend itself to the unavoidable multiple perforation that occurs in the small intestine. The danger of leaking is also less on account of the greater solidity of the contents. In the case of the full stomach, the same would hold good as regards leakage, but not multiplicity. Operation is more likely to do harm than good, in consequence of the pulling about that the abdominal contents must necessarily be subjected to, and the breaking down of any lymph adhesions that commence to form and occlude the minute openings in the bowel within a few hours of the infliction of the wound.

AMPUTATION.

As in abdominal operations, so, also, in the matter of amputations, it is undoubtedly wiser in time of war to stay your hand. Take an Australian example. An officer's servant in the New South Wales Lancers was shot at Paardeburg in the upper third of the thigh. He was anæsthetized, and an amputation was to be performed at the hip joint by an eminent London surgeon, when the order came for a general advance, and the wounded were shifted to Kimberley. The man arrived there after four days' waggon travelling, with his wound in a septic condition, and came under the care of a civilian surgeon, Roscoe, who removed a splinter of bone, five inches long, bathed in pus, and found the upper fragment denuded of periosteum. Several other fragments were extracted at various times, the last five months later. He contracted erysipelas in the ward, where there were numerous typhoid patients. Ultimately immense bodies of callus were thrown out, and the man returned to Sydney badly lame, but able to earn his living.

ENTERIC FEVER.

In South Africa this presented itself in four types, (1) the book type, (2) the ten-day type, (3) the ambulatory type, and (4) the typho-malarial, or Orange River fever.

(1) Book Type.—Outbreaks like that at Bloemfontein, where the South Australian nurses were located, occurred as the result of repeated doses of the same bacterial flora on the intestinal follicles. While troops were on the trek, a passing diarrhœa, as the result of a simple dose, would be followed by a period during which the raw intestinal follicles would have a respite.

Some men, of course, were immune, as they must have absorbed many doses of typhoid germs during the protracted siege of Ladysmith, and yet escaped an attack of the fever.

(2) The Ten-Day Type.—In several of this form Widal's test was applied, and a reaction occurred. Not all the cases so tested had been inoculated. The onset was insidious, showing premonitory symptoms like those of influenza, but without the initial rigour. Headache, however, was not very severe, it was worse at night. Post orbital pain and tenderness were present. The chief complaint was of pain in the back and limbs. This pain is relieved by change of position; but after the thighs have remained flexed for a few minutes, a similar pain is felt in the muscles of the thigh and the calf.

Prognosis, in spite of the temperature, is good. The temperature reaches a maximum about mid-afternoon, and evening sweats are common. By 10 p.m. there is a marked lowering of the temperature. Sleep is disturbed on account of the back pains. The tongue showed the usual appearances seen in enteric fever. There was diarrhœa for about three days, after which there was a tendency to constipation. When first seen the patient's temperature is about 102 deg. F. After two days it reaches 104 deg. to 105 deg. F., then a lysis occurs, extending generally over ten days. There is great weakness, but a quick return of appetite. The patient gets a rapid accumulation of abdominal adipose tissue in the peritoneum and the abdominal walls. Salicylates and other anti-rheumatic remedies have little effect upon the pains, and increase the distress of the patient by prolonging the evening perspirations and producing temporary outbreaks of sweat during the day. Local application of counter irritants gives far better results.

(3) Ambulatory Type.—Cases of this type were probably very numerous. In fatal cases the *post-mortem* examination disclosed a few (three or four) ulcers, very large in size and deep. The temperature was of septicæmic type, ranging to 104 deg. and 105 deg. F., and persisting till death. Actual perforation was seldom met with.

(4) The Orange River, or the so-called Typho-Malarial Type.—In this, hæmorrhage from the gums, nose, or bowels was not at all uncommon. There was no abdominal tenderness. The fever lasted for three weeks. There were morning remissions. In some cases the same patient was the subject of three attacks within six months.

Cheyne-Stokes respiration is a fairly common complication of enteric cases seen in South Africa. The prognosis, though bad, is not necessarily hopeless.

Treatment.—In treating enteric cases, in fact, cases of any illness, properly constructed tents, such as the Indian “E.P.” tent, are far preferable to houses. The “E.P.” tent is cool on a hot day, and warm on a cold night, beautifully ventilated, and easily closed if draughts are too strong. Such tents would be of considerable service in the treatment of cases of infectious diseases in Australia.

In feeding enteric patients, milk, milk and soda, and stimulants are usually sufficient for the ordinary cases; if, however, the medical man thinks that the patient requires more, there is no reason why he should not give light custards, brandy, egg and milk, strained soup, beef tea, and bovril. We adopted this treatment in South Africa, and never had cause to repent it. The dangers of perforation are slight, and certainly did not in any way seem to be increased by such a diet; and the cases that benefited by it were extremely numerous. Our rule was to feed the patient in the orthodox way; but if he felt he would like something more, then it was not withheld, especially if the tongue was moist. Care should be taken to examine the patient's stool, and to watch for undigested particles of food. If these are seen the diet should be lessened, or, if it is undigested milk, the quantity should be decreased and the milk peptonized. It was our practice to give from two to three ounces of brandy in the 24 hours almost without exception, unless the patient objected. The quantity was, however, never increased beyond six ounces in 24 hours.

As in the case with plague in India, so with enteric in South Africa, the best remedy for severe headaches and hyperpyrexia was found to be antipyrin given in doses of from 5 to 10 grains, always, however, combined with citrate of caffeine. In no single instance have I seen this do harm, and the benefit to the patient has been considerable.

In administering chloral hydrate as an hypnotic, we found that in some cases it had an opposite effect, and caused increased excitement.

DIARRHŒA.

Diarrhœa was so common that it came to be regarded almost as a normal condition. Unless vigorously treated with sulphate of magnesia or sulphate of soda, it often culminated in non-amœbic dysentery. It was quite frequently followed by hepatic suppuration, often multiple, and sometimes recognised only *post-mortem*.

I saw a patient operated upon by Major Burnside, at Ladysmith, who recovered, notwithstanding the plurality of foci. Dr. C. S. Bruce, nephew of Dr. Mitchell Bruce, showed me five convalescents under his care at Newcastle, Natal. I think his success was due to the unusually bold

incisions he made. At Charleston, I saw one case in which a free incision into an abscess in the left lobe was of no avail.

Many troopers had tender livers, jaundice, and clay-coloured stools. Some had actual foci of pus which, in some cases, must have dried up, leaving an adhesion to the parietes, indicated by a sharp pain felt when lacing up the boot on the right foot. Twice I noticed cicatrical patches and dried up pus foci in the livers of irregulars from Johannesburg, who died of pneumonia several months after an attack of hepatitis.

PHTHISIS.

Cases of fibroid phthisis did badly on the high veldt, as there is not resiliency of lung tissue, and the cavities fill with mucus. There was immense straining in dispelling mucus in the mornings. I saw several reservists who had been told by their medical advisers in England that the air of South Africa would benefit them. The possibility of enduring the hardships of war had not been sufficiently considered, and they did not return. The pneumonic form of phthisis, on the contrary, did remarkably well on the high veldt, if the sufferer's were properly fed and exposed to the sun.

ALCOHOLISM.

The number of drunkards caused by the unwise distribution of rum rations on Friday night was noteworthy, the abstainers selling their shares to the hospital orderlies.

At Bloemfontein, where the South Australian nurses had their headquarters, I was told of five soldiers who died one very cold night of acute alcoholic poisoning—three being boys under twenty.

THE PHYSICALLY UNFIT.

The inclusion in the army sent to South Africa of many unfit persons was notorious. Of phthisical reservists I have already spoken. Too many men with flat feet and hammer toes found their way to South Africa. I remember on one occasion, when Colonel Johnson, P.M.O., Maritzburg, was inspecting a convoy of invalids on the eve of their departure for England, he asked one man with a flat foot where he had been wounded—meaning on what battlefield. In reply he was told, "Oh! in the toe, which, before I left England, was cut off, in order that I could accompany my regiment. My foot, however, prevented me from going inland with the others." "Well," replied the Colonel, "I hope the three months' rest on full rations in Africa and the double sea trip will benefit you, my man. Doubtless on your return you will be able to give a vivid description of your many battles, and you will receive a medal like those who fought in them."

A civil surgeon told me that a Highlander, sent from the field of Magersfontein to De Aar as mortally wounded, was found by him not to have been shot at all. His toe hurt him, so he lay down amongst the dead heroes of the Highland Brigade. The surgeon, to save him from ignominy, amputated his toe there and then and placed him on the list of wounded. There were numbers of men with hernia, many of which were incisional after operations of the appendix, or were due to attempts at a radical cure. I saw one man whose abdomen a London surgeon had opened twelve years previously for omental hydatids.

A private in a Yorkshire regiment (a Frenchman!), who had been operated on two years previously for double inguinal hernia, in Paris, found that his scars were yielding as a result of the severe marching that preceded the entry into Ladysmith. As he objected to being invalided to England, advantage was taken during the lull which followed the relief of Ladysmith to re-operate him, and he eventually returned to the front to try, as he said, to take the V.C. back to France. This sort of heroism is, however, paralleled by the case of an Australian nurse the sister of a distinguished gynæcologist, who, in spite of a recent severe abdominal operation, volunteered for service in the war, and managed to continue to the end without once reporting herself sick, notwithstanding the ever-increasing discomfort caused by a silk suture clamouring for exit, which she herself eventually removed while on duty in Rhodesia.

Cases of mastoid disease operated on in England, which became re-kindled under the stress of exposure, were in two instances successfully treated at the base by civil surgeons.

One of the greatest sources of weakness was dental disease, and the inadequate means of treating it in the army. One commander lost time through being forced to have his teeth attended to at some distance from his command. Another, mindful of laurels already won, utilized the services of an amateur dentist from New South Wales while on trek.

A lieutenant, son of an Adelaide doctor, in charge of a howitzer, through being away at the dentist in Pretoria on 48 hours' leave, missed sharing the unbounded kudos which fell to his N.C.O. the very night the Boers made their attack on the camp of the Buffs at Balmoral.

Two dyspeptic gunners, on their way to England as invalids, were enabled to return to the front through the kindness of the Natal branch of the Red Cross Society in spending 32 guineas on new teeth for them. The administrator of the society then made it known that disbursements of this nature would not be permitted in future.

An accident to the denture of a Queenslander placed him on the sick list for gastritis, and was responsible for his repatriation; otherwise he would probably have shared the fate of Lieutenant Morant, of the Bushveldt Carbineers.

Senility was another cause of inefficiency. In one irregular corps operating in Cape Colony, there were several old men who had shaved their chins and dyed their moustaches in order to pass into the service of the Empire.

In one of our own contingents there was a trooper over 50 years of age, who wore a truss, a glass eye, and a denture.

In several cases of suicide that came under my notice the *morituri* had been doomed by their physicians before they left for the theatre of war; and it is difficult to explain how they succeeded in eluding the vigilance of the recruiting medical officers.

I am treading on delicate ground, but will limit myself to cases related to me by members of this Congress whose statements are easily verified.

A gentleman from New South Wales consulted a member of this Congress, who found his urine loaded with albumen, and warned him that his condition was a serious one. The patient immediately enlisted, and had the glory of being the first Australian killed on the field of battle in South Africa. Another gentleman, whose photo stands on the mantelpiece of one of the leading surgeons of Sydney, was warned by the latter of the serious nature of an internal growth. He enlisted for Africa, and had himself killed in battle at the first opportunity.

A man with hepatic dropsy periodically visited the Prince Alfred Hospital, Sydney, to be tapped. On one occasion he anticipated the usual period, stating that he was going a journey, and would be out of Sydney for longer than the usual interval. His fluid was drawn off, and he sailed for Africa as a trooper, but was invalided back to Australia on his arrival.

A New South Wales degenerate was allowed to join a Victorian contingent, and sailed for South Africa, where, a few weeks later, he was condemned to death for inciting to mutiny; but on account of the clamours of well meaning strangers, who did not know him, he was reprieved and sent back to his native township, to the intense disgust of his fellow citizens who expected that he would have had the decency to get himself killed. He was then sent to gaol for six months.

A PLEA FOR SELECTION OF THE FIT FOR SERVICE IN THE FIELD.

M. H. DOWNEY, M.B., B.S..

Civil Surgeon attached the R.A.M.C. during the late War in South Africa.

I am firmly convinced that, in the many published articles and reviews on the late Boer war, insufficient comment has been made on the fact that large numbers of soldiers were sent from England to the Cape, who were physically unfitted to endure the necessary hardships of active service. In connexion with this subject, the following account of some of my experiences as a surgeon attached to the R.A.M.C. refers not so much to the seasoned and well trained regulars as to those troops of raw militia, which were composed largely of youths who had vacated various peaceful occupations to suddenly become soldiers for active service, and whose passing of the necessary medical examination must surely be characterized as farcical. In a paper entitled *National Military Service and National Physique*, read by J. Ellis Barker, at the annual meeting of the B.M.A., in July, 1908, the following passage occurs:—"There cannot be a greater contrast than that offered by a comparison of our recruits, many of them under-sized, under-developed, and half-starved weaklings, taken from the ranks of the unemployed, and born in the slums, and of our Indian battalions, and reserve battalions, which are filled with tall, broad-shouldered muscular men, the very finest specimens of British manhood." In the discussion which followed this paper, Dr. W. A. Bond, of Holborn, said that as a regimental surgeon during the South African war, "he passed youths who were below the required chest measurement, for he was confident that after a short training they would come up to the standard." On one of the voyages made by the troopship *Aurania*, in the year 1901, from England to the Cape, there were on board, besides several officers and surgeons, two battalions of militia troops. Many of these citizen soldiers were of wretched physique, and there was a rather large amount of sickness during the voyage out, with the result that several of the weakest succumbed. A *post-mortem* examination on a soldier who was found dead in his bunk one morning revealed well-marked aortic disease and atheroma, the physical signs of which must surely have been recognisable before the man left England. The Adjutant (always a regular officer attached to the militia battalion) on hearing the result of the *post-mortem*,

made some forcible remarks, and complained that "it was bad enough that the men could scarcely tell one end of a rifle from the other without their having heart disease also." On arrival at the Cape, one of the battalions, to which I was attached *pro tem.*, proceeded to Kimberley. At the large military hospital of Kimberley, where I was attached for some time to the medical staff, it struck me there was far more sickness amongst comparatively recent arrivals (I refer again to militia) than mere changes of scene, diet, and circumstances would explain. Here, one saw evident signs of phthisis in a poor, white-faced youth of eighteen, whom it was impossible to imagine as robust on the eve of his departure from England; there a man with a mouth full of decaying teeth, eating his soft diet, and waiting to take his place in the next batch of invalids returning to England. Indeed, it was distressing to notice the alarming number of recent arrivals who had decayed teeth, and who were necessarily quite unfit for hard campaigning. In Vryburg, which was General Lord Methuen's headquarters, I had the opportunity of seeing and contrasting with the militiamen some regiments of regulars, amongst others the 5th Northumberland Fusiliers. These men, like all the other regulars I subsequently saw, were fine, sturdy specimens of humanity, with the general bearing of genuine soldiers, and contrasted with the very frail-looking youths who constituted a large part of every militia regiment, it seems small wonder that they justified their title of "The Fighting Fifth." Each morning my duty took me to various camps to inspect the sick, or rather to inspect, examine, and sift out those who had some bodily ailments from those who, for various reasons, but principally because they disliked early hours and systematic work, "reported sick" on the off-chance of a sympathetic medical officer relieving them from duty; these malingering gentlemen were known in the army as "scrimshankers." One of the camps so visited was that of a militia battalion which had arrived at the Cape some months previously. Here, again, one could not help observing with disgust the large number of frail-looking youths who formed part of this battalion. I remember, amongst other cases, one young fellow who presented himself with a doleful but earnest complaint of "great nervousness and want of sleep." On examining this patient, I found him to be suffering from flatulent dyspepsia, the symptoms of which he assured me were of old standing, and he was undoubtedly highly neurotic. He told me he had no willingness to come out to the war, but left with his battalion under the following circumstances:—When its turn came to go on active service, the battalion, which had, of course, previously signified its willingness to serve, was drawn up for inspection. After its commanding officer had duly informed them that they were to go on active service, and had depicted amongst much enthusiasm, the glories of fighting for one's country, &c. &c., those men who for any reason were unable, or unwilling, to go were told to stand aside (or send in their names to the Adjutant, I forget which). Now, as my informant pointed out, was it likely any one would stand aside, to feel deeply humiliated before his comrades, no matter what reason he may have had for not wishing to go? I was also assured that the medical examination for "fitness" was of the most cursory description, and was looked upon as the merest formality. One night, a brush with the enemy took place at a line of blockhouses on the outskirts of Vryburg, and next morning as I was riding with a young officer past one of the blockhouses in question, the sentry was found fast asleep beside his rifle. He was court-martialled, and received six months' imprisonment. I mention this incident, merely with the idea of pointing out that the sentry was a young

fellow belonging to a recently imported militia battalion, and was not capable of standing the mental and physical strain incidental to the night attacks and vigilant sentry duties of an active campaign. On five or six subsequent occasions, in different parts of the country, I came upon militia sentries fast asleep at their post (which infringements of military duty I did not deem it my business to report), but I never, by any chance, came upon sleeping sentries amongst regulars, or amongst irregulars who had been specially picked from a list of applicants, prior to their being sent to the front." In Mafeking, where I was a member of the staff at the military hospital, the town garrison consisted partly of regulars, and partly of militia. Amongst the former were the Loyal North Lancashire (Methuen's greyhounds), the Inniskilling Fusiliers (who arrived towards the end of the campaign), the Cape Police, and detachments of other branches of the regular service. These were nearly all fine soldiers, who could be relied upon to sustain long marches, to acquit themselves creditably before the enemy, and to thrive on hard biscuits and "bully beef." The militia regiments (with the single exception of the South Wales Borderers, who were good soldiers, and had become seasoned by long campaigning) had come from various parts of Great Britain, had not been long in South Africa, and contained the usual proportion of rotten-toothed men, and youthful weaklings, very many of whom subsequently died of enteric fever, or became incapacitated through chronic dysentery. Each morning a "sick parade" was held at the hospital, and one naturally had a good opportunity of observing the physical defects above alluded to. On the occasions when it was necessary for the members of the medical staff to write out the invaliding documents relative to the batch of men who were being next invalided back to England, one usually found that in a large proportion of cases, the cause assigned was "defective teeth," and, moreover, that many such cases had arrived comparatively recently in South Africa. Similar batches of men from various parts of the country were sent back at different times to England, for naturally enough those men who had defective teeth could not masticate biscuits and "bully," and were therefore quite unfit for active service. On one occasion a "trek" was suddenly ordered to Zeerust, and the column, consisting of 250 regulars, 250 militia, and a few mounted troops, was under the command of Colonel Palmer. We left Mafeking at sundown, and brought up at Ramathlabama about 10 p.m. On this march, I was first of all requested by many of the militia to permit of their accoutrements being carried in the ambulance, but soon I had to carry men, as well as accoutrements. After breakfast next morning we marched a second stage under a fairly warm sun, and during this stage the militiamen began to tire. Some had badly skinned heels, some got varying degrees of sun-stroke, and others fainted from a variety of causes. Soon my ambulance was full of sick, sore, and fatigued men, and eventually I dismounted, and gave my horse to a foot-sore and tired youth, whose unskilful attempt at mounting elicited ironical cheers from the sturdy and steadily marching regulars. In this manner we eventually got to our destination, and I mentally resolved that if ever I had to accompany militia troops "on trek" again, I should apply for four ambulance vans instead of one. A line of blockhouses connecting Mafeking with Lichtenburg (a town in the western Transvaal), was occupied by a militia battalion, which had been in South Africa about five months. Another line of blockhouses connecting Maritzani with Polfontein (a fort on the first-mentioned line) was occupied chiefly by regulars. When those much dreaded scourges, enteric

fever and dysentery, began to manifest themselves on the abovementioned blockhouse lines, it is worthy of note that while the regulars suffered but comparatively slightly, the ill-fated militia were sent in ambulance loads to the hospital. Allowing for the fact that the regulars certainly did pay more attention than did the militia to the order that "all drinking water must be boiled," yet it was noticeable that in the majority of cases the disease picked out the weaklings. Numbers of men who had defective teeth (including a sergeant who did not possess a single tooth, real or artificial), and who could not possibly eat blockhouse rations, were sent to hospital, to be ultimately invalided back to England. In conclusion, I would suggest that in future campaigns, for the sake of our national safety as well as our national pocket, every soldier sent on active service, provided he be not already a well-trained regular (who takes naturally to soldiering), should be carefully and judiciously picked, without fear or favour.

DISCUSSION ON PAPER BY CAPTAIN DOWNEY.

LIEUT.-COLONEL FIASCHI, D.S.O., thought that every one agreed with the plea for more care. Every day on "trek" in South Africa he found the same thing. His personal experience was that the men from Australia had been better examined than those from some of the other colonies. Varicocoele was a common state for "scrimshankers" to play upon.

MAJOR WATSON knew of four men who went to South Africa to die. They knew they were incurable before going. One man was tapped in Sydney Hospital for ascites a few days before he enlisted.

GENERAL WILLIAMS, C.B., knew that many men were fixed up in order to get away. He found that there was a great difference in work by individual medical officers. He found the physique of mounted troops by far the best.

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